The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

JULY, 1925

Data Sheets for Use Under Wisconsin Code

How Necessary Information May Be Arranged for State Approval of Plans, with Confidential Data on Separate Sheet

By Ray A. Small, Advisory Engineer

Formerly Ventilation Engineer for the Industrial Commission of Wisconsin.

IN EXPLANATION of the data sheet forms shown herewith, it may not be out of place to note some of the reasons for their development. They were developed for use with the Wisconsin Heating and Ventilation Code and so as to be adaptable to private practice.

Like any other careful contractor, it had been the writer's habit to study and estimate a job before placing a bid, but his data sheets were irregular and made up for each job. The now happily obsolete blanket clause in specifications requiring the contractor to guarantee the adequacy of radiators, fittings, pipe lines, boilers and the chimneys specified by the architect, was then in general use and the writer soon learned the value of independent calculation.

IMPORTANCE OF SYSTEMATIC PRESENTATION OF DATA TO SECURE APPROVAL

In the State service it was soon found that if State approval was to be any protection to unwary owners and

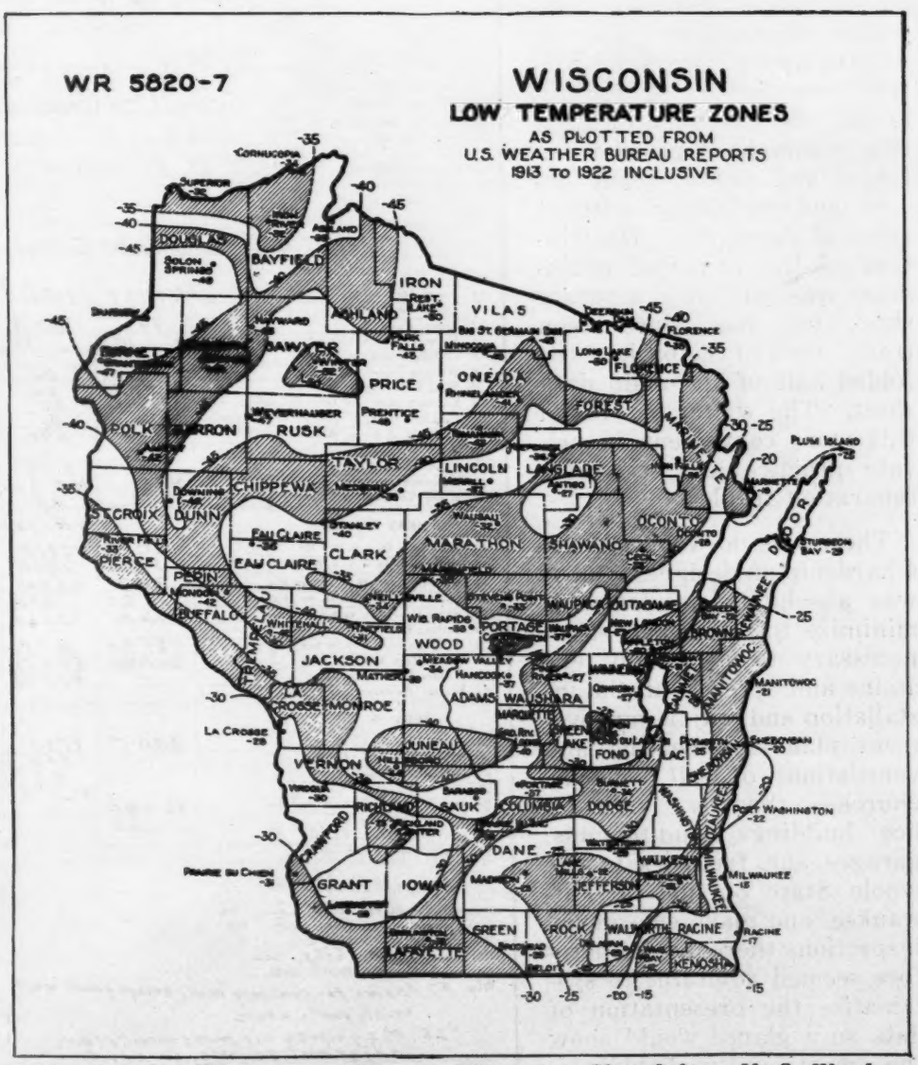


Fig. 1. Low-Temperature Zones in Wisconsin. Plotted from U. S. Weather Bureau Reports

taxpayers, or anything but a perfunctory rubber stamp, many of the plans submitted must be disapproved because of lack of information shown for the jobs. The systematic presentation of data necessary to an intelligent approval required an arrangement adaptable to all kinds of systems and various methods of calculation and guessing.

HOW CONFIDENTIAL DATA WERE SEGREGATED

The code requires that approved plans be kept at the building during installation period, and, being subject to general scrutiny and examination by competitors, it was objectionable to engineers and contractors to put too much engineering data on the plans themselves. This objection, however, was avoided by filing the data on separate sheets for State records. Being somewhat confidential these data were customarily filed with correspondence and the forms were thus restricted to letter size.

The sample data sheet shown herewith is, therefore, a development, rather than of spontaneous origin. In order to cover a majority of jobs the form must provide for at least twelve rooms. Folded double-width sheets were selected and the upper right-hand portion was perforated for removal so the identification title would be exposed when folded and permit ready access and unfolding without removal from file. Description of the principal equipment was put on a separate sheet but has since been transferred to the back of the folded half of the main data sheet. The writer has found this more convenient in private practice and it avoids separation in files.

There was no wish to work a hardship on designers but it was absolutely necessary to minimize the time and effort necessary to personally examine and approve all the installation and major improvement plans for heating and ventilation of all schools, churches, theatres, large office buildings, auditoriums, garages and factories in the whole State outside of Milwaukee, and make emergency inspections thereof. It therefore seemed advisable to systematize the presentation of data so a glance would show the scheme and probable adequacy of the plan layouts.

COMPILATION OF HEAT LOSS COEFFICIENTS

The B.T.U. method of calculation seems to be the only reliable method for all buildings and all systems of heating and ventilation service. It was not very generally in use at the time but was finally agreed upon and heat losses were tabulated, in spare time, from A.S.H. & V.E. Proceedings, THE HEATING AND VENTILATING MAGAZINE, Webster's Steam Heating and other reliable sources, for a total of 142 kinds of construction and 399 thicknesses thereof. Each kind of construction was illustrated and given a numerical symbol. The heat lost per square foot of 70°-room surface was given direct for each 5° of outside temperature from —10° to —50°, and window infiltration heat losses were similarly tabulated for good, average and poor windows in winds from 5 to 20 miles per hour.

All these tables were included in the Working Rules for publication with the code, but have since been removed therefrom. The manifold purpose of inclusion was to secure a reputable standard of comparison of calculated features of design; elimi-

RAY A. SMALL, Advisory Engineer

Heating and Ventilating Data Sheet

No. 509

N 15 % NW ___ % NE ___ % W 10 % E 10 % SW ___ % SE ___ % S 0 %

Exposure Factors

Based on -30 °F. Cold Weather & Prevailing Winds From NW

Bldg. School and Community Bldg Date May 16, 1925

Dist. No. or Loc. Babaroo Twp. Co. Kusa

Bldg. Archt. E.H. Nenjen H. & V. Engr. R.A. Small

Rooms No.	1	2	3	4	16	11
Use	G. Toilet	G. Play	B. Play	B. Toilet	Hall	G. Coats
MEASUREMENTS						
1. Room Dimensions	13x11x9'	24x35x9'	34'x24'x9'	13x11x9'	14x26x36 ceiling 152	13'x11'x9'
2. Cubic Feet Space						
3. Room Floor Area	143	804	845	143	364	147
4. Floor Const. & Factor	3 - 18.6	17.	17.	18.6	16.	—
5. Ceiling Const. & Factor	—	—	—	—	1 - 48.	285-S.
6. Window Const. & Factor	1 - 110	Do	Do	Do	Do	Do
7. Wall Const. & Factor	21,1 - 29	Do	Do	Do	2 - 28	26
8. Exposed Sash and Door Perimeter, equiv.	30	35	65	26	197	22
9. Leakage B. T. U. per ft. of Perimeter	114	Do	Do	Do	Do	Do
10. Expd. Wall Gross Area	228	620	560	228	828	208
11. Expd. Window Gross Area	28	71	54	22	113	67
12. Expd. Wall Net Area	200	549	506	206	715	221
13. Exposure Direction	N E	N E S	S W	W N	N	N E
14. Room Temperature	70	65	65	70	60	65
HEAT LOSSES		← ALTERNATE →				
15. Wall Loss B. t. u. per Hr.	5800	15900	14700	5970	20000	5900
16. Window Loss B. t. u. per Hr.	3080	7800	5940	2420	12450	2370
17. Subtotal Loss B. t. u. per Hr.	8880	23700	20640	8390	32450	13270
18. Expos. Allow. B. t. u. per Hr.	1120	1660	1220	1070	4060	1610
19. Floor Loss B. t. u. per Hr.	2660	13660	14350	2660	5820	—
20. Ceiling Loss B. t. u. per Hr.					7300	235
21. Leakage Loss B. t. u. per Hr.	3920	8550	7420	2960	12900	8200
22. Total Heat Loss	16080	47570	43630	15080	63330	23835
23. Deduct for Heater Size	—	47570	43630	2000	—	—
24. Heater Building-loss Load						
SERVICE						
25. Air Supply C. F. M.	300 M	1210	1270	300 M	600	300 M
26. Recirculation C. F. M.		500	1000			
27. Air Supply Inlet Temp.		92	84		110	
28. Air Supply B. t. u. Service		47570	43630		32700	
29. Direct Radn. B. t. u. Service	16080			15080	30630	23835
30. Direct Radn. sq. ft.	67			63	114	98
31. Grav. Ind. Radn. sq. ft.						
32. Aspir. Coils Radn. sq. ft.						

EXPLANATORY NOTES

Steam Press. at Dir. Radrs. 2 lbs.
Steam Press. at Ind. Radn. 2 lbs.
Water Temp. at Radiators ___ ° F.
Hot Water Tank Cap. City Gals.
Recirc. Air Temp. at Heater 60
Risc. #7 Allows for concrete walls below grade and brick walls above.
#25 M signifies air movement from adjacent rooms, to vent.

ADDITIONAL HEATER LOADS

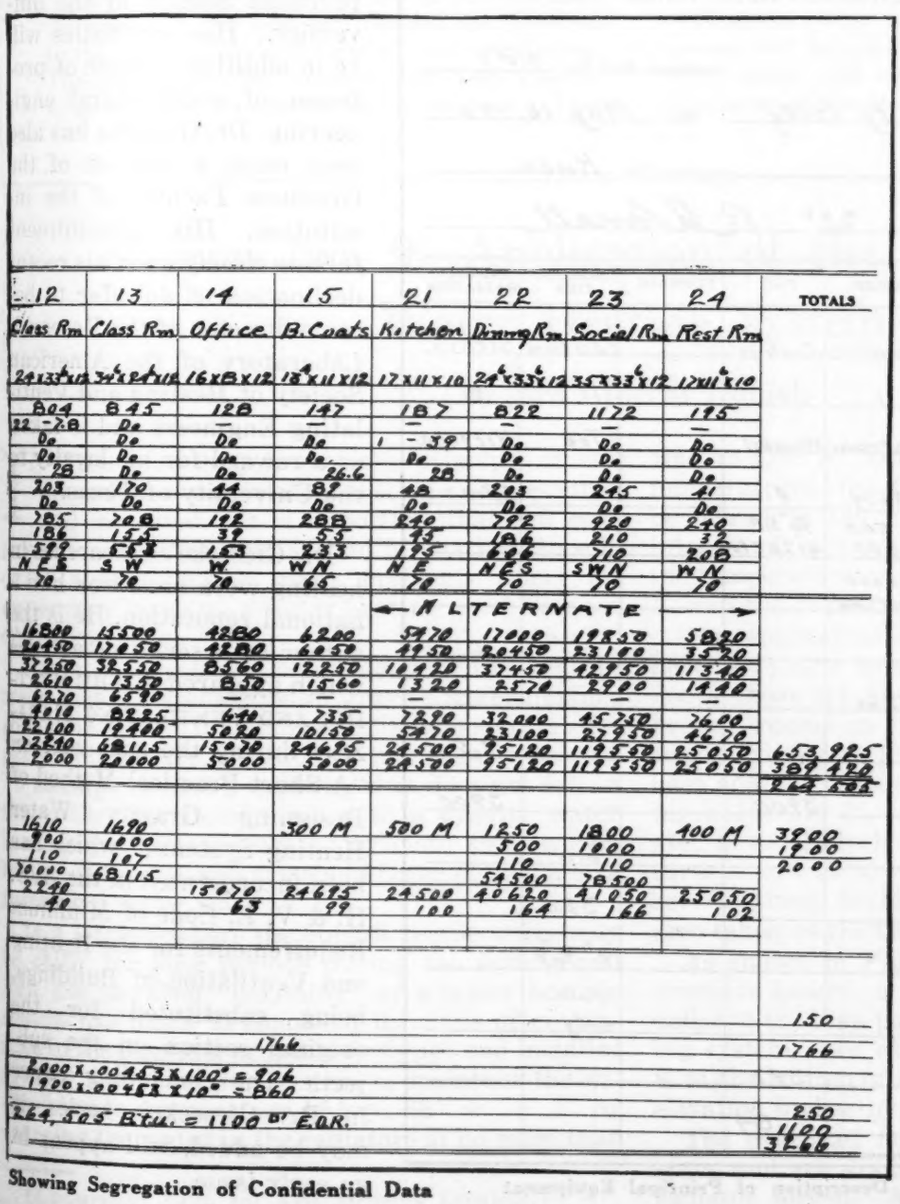
33. Piping Allowance E. D. R.
34. Gravity Indirect Radiation and Aspir Coils, E. D. R.
35. Fan Indirect Radiation, E. D. R.
36. Hot Water Tank Service, E. D. R.
37. Outside Air Heat Loss, up to room temperature
38. Recirc. Air Heat Loss, up to room temperature
39. Humidity Service 2000 ÷ 8
40. Heater Bldg.-Loss Load
41. Total Heater Load

Fig. 2. Sample Data Sheet

nate waste of time in haggling over important details of inadequate design; systematize the data so as to economize on the time and search required for approval; and to encourage unskilled designers to use up-to-date methods of estimating and realize more thoroughly that a good heating and ventilation job is something more than a mere guess.

Brief experience with the new code in the absence of these standards seems to show regrettable encouragement to *uneconomically* cheap jobs because plausible presentation of grossly inadequate jobs seems to win approval as readily as for legitimate jobs. It not only cheapens the State approval but it is a serious detriment to the profession because of the commercial difficulty of maintaining a high standard of service under such competitive conditions.

Based on the heat loss tables and symbols, the data sheet can be made to concisely express the designer's conception of the job. In the illustration herewith slide-rule values have been used but the material was taken from an actual job current, to show something of the scope and flexibility of the Wisconsin Code. When an engineer has completed all the items on the data sheet particularly applicable to his system of design, he understands the job and its important peculiarities and he has saved many hours of rearrangement otherwise probable.



12	13	14	15	21	22	23	24	TOTALS
Class Rm	Class Rm	Office	B. Coats	Kitchen	Dining Rm	Social Rm	Rest Rm	
24 1/2 x 34 1/2 x 12	34 1/2 x 24 1/2 x 12	16 x 8 x 12	18 1/2 x 11 x 12	17 x 11 x 10	24 1/2 x 33 1/2 x 12	35 x 33 1/2 x 12	12 x 11 1/2 x 10	
804	845	128	147	187	822	1172	195	
22 - 28	Do	—	—	—	—	—	—	
Do	Do	Do	Do	1 - 39	Do	Do	Do	
Do	Do	Do	Do	Do	Do	Do	Do	
28	Do	Do	26.6	28	Do	Do	Do	
203	170	44	87	48	203	245	41	
Do	Do	Do	Do	Do	Do	Do	Do	
705	708	192	288	240	792	920	240	
186	155	39	55	45	186	210	32	
599	658	163	233	195	696	710	208	
N E S	S W	W	W N	N E	N E S	S W N	W N	
70	70	70	65	70	70	70	70	
				← A L T E R N A T E			→	
16800	15500	4280	6200	5170	17000	19850	5820	
20450	17050	4280	6050	4950	20450	23100	3520	
37250	32550	8560	12250	10120	37450	42950	11340	
2610	1350	850	1560	1320	2570	2900	1440	
6220	6540	—	—	—	—	—	—	
4010	8225	640	735	7290	32000	45750	7600	
22100	19400	5020	10150	5170	23100	27950	4670	
22240	68115	15070	24695	24500	95120	119550	25050	653 925
2000	20000	5000	5000	24370	95120	119550	25050	389 420
								264 505
1610	1690		300 M	580 M	1250	1800	400 M	3900
900	1000				500	1000		1900
110	107				110	110		2000
20000	68115				54500	78500		
2240		15070	24695	24500	40620	41050	25050	
40		63	99	100	164	166	102	
								150
1766								1766
2000 x .00453 x 100° = 906								
1900 x .00453 x 10° = 860								
264,505 Btu. = 1100 B' E.D.R.								250
								1100
								3266

Showing Segregation of Confidential Data

HOW COST OF INSTALLATION WAS REDUCED

The cost of installation, as well as of subsequent operation of this job, was cut down considerably by using a low per cent split system, instead of a high per cent split, and the job was effectually fool-proofed—two very important items. For 2-classroom buildings the code permits exclusion of service to the playrooms and the second-story rooms in determining the minimum size of equipment, and it proved a desirable conservation of both space and money in this case.

DETAILS OF INFILTRATION DATA

Infiltration losses are severe but will occur on but two adjacent sides of the building simultaneously, so Item 23 was included in order to avoid unnecessary capacity of the total plant and yet amply provide for each room on respectively most severe days. It is assumed that the wind blows on the two adjacent sides having the most windows and wind exposure, then Item 21 and possibly some of Item 18 is deducted for the lee rooms, along with the alternate services, in determining the required size of the heater. This is taken to be unnecessary refinement by some designers, but the principle is correct and our profession will gain in the long run, from just appreciation of heat loads.

DEVELOPMENT OF STATE MAP, SHOWING LOW-TEMPERATURE ZONES

Severity of outside weather conditions was a common haggling point with low bidders and of serious concern to engineers who did not want to put hill-top installations in valley buildings. Accordingly the U. S. Weather Bureau low-temperature reports were plotted on the State map and isothermal lines were drawn thereby for each 5° from

—15° to —50°, thus establishing the several low-temperature zones as accurately as possible. Survey of records for ten years showed variance of less than 3° in low points from year to year, generally, and a glance at the accompanying map shows the temperature zones utterly independent of latitude zones. The recent reduction to three latitudinal zones for the entire State affords further opportunity to discredit the State approval based thereon through disproportionate load on some communities and inadequate facilities for others.

HOW STATE CODE IMPROVES QUALITY OF INSTALLATIONS

To maintain a high standard of excellence in heating and ventilation work requires accuracy and standardization of data, equitable conditions of competition for business and a just appreciation of service rendered. Experience shows that, under conditions of wide competition, the State Code of *minimums* becomes the practical code of *maximums*. Jobs are apt to be more frequently under than over the requirements of law. Appreciation of service is a potent factor over a term of years but, in the meantime, the worst offenders have generally gotten their money and gone. The only fair and workable basis of comparison, therefore, is the State Code and the official approvals thereunder. Every effort should be made to uphold the worth, integrity and reliability of State approvals. Systematic presentation of, and insistence upon, engineering data showing basis of design is a long step in that direction.

R. A. SMALL, Advisory Engineer
VENTILATION, HEATING, COMBUSTION AND DUST CONTROL

Equipment Sheet No. 509

Building School and Community Bldg. Date May 16, 1925

Dist. Number or Address Babaroo Twp. Co. Kusa

Building Architect E.H. Nenjen H. & V. Engr. R A Small

CLASSIFICATION	BOILER	FAN	FURNACE	HUMIDIFIER	INDIRECT RADIATION
1. Type of Units Used	Smokeless	Centrif.		Coil Pan	Steam
2. Number of Units Used	1	1		1	2
3. Line of Manufacture (Basis of Design and Selection)	Darina	Wambel		Job	Niforce
4. Catalog Number	3614	1			18 Row 3.5
5. Wisconsin Rating (Show Unit of Measure)	EDR. 3300	3/4" S.P. 4120 CFM			
6. Kind of Fuel (Usee in Selecting Heater Size)	12,000 Soft Coal				
7. No. of Indirect Stacks in Series					2
8. Total Heater Load in Place (B.T.U. per Hr. or Sq. Ft. E. D. R.)	3266				
9. Air Supply Free Area (Through Heater Air-way)					3.5
10. Air Supply C. F. M. Net Total in Place)		3900			3900
11. Water Req'd. for Humidity (Gallons per Hour)				6.6	
12. Humidifier Evaporating Surface (Net Total Sq. In.)				320	
13. Humidifier Fire-box Water Coil (Length and Size)				9' 3/4" ϕ	
14. Humidifier Reservoir Cap. Avail.				Auto. City	
15. Working Speed, R. P. M.		397			
16. Brake H. P. Required		.84			

Fig. 3. Separate Sheet for Description of Principal Equipment

Promotion for Dr. F. E. Giesecke

Announcement is made of the appointment of Dr. F. E. Giesecke, professor of architectural engineering at the University of Texas, to the position of director of the Engineering Experiment Station of the university. His new duties will be in addition to those of professor of architectural engineering. Dr. Giesecke has also been made a member of the Graduate Faculty of the institution. His appointment follows closely upon his recent declination of an offer to become director of the Research Laboratory of the American Society of Heating and Ventilating Engineers and is taken as a reward for his loyalty to the University of Texas.

Dr. Giesecke's researches in heating work have won him a national reputation. He is the author of a series of articles which appeared in THE HEATING AND VENTILATING MAGAZINE during the past year on "A Short Practical Method of Designing Gravity Water Heating Systems," which has been incorporated in the A. S. H. & V. E. Code of Minimum Requirements for the Heating and Ventilation of Buildings, being substituted for the original section on the subject. The concluding paper in Dr. Giesecke's series, it may be added, will appear in an early issue.

This is the ninth lesson of

The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Instruction in this course is available only to subscribers of The Heating and Ventilating Magazine. The first lesson appeared in the November, 1924, issue. However, students can commence the course at any time. Immediately upon receipt of your enrollment, Lesson 1 will be sent to you, together with the Work Problems pertaining to Lesson 1. Full directions will be included as to where to send your solutions of the Work Problems.

The complete course consists of not less than 30 lessons. The first five lessons are devoted to the fundamentals of heating and ventilation. The second section, commencing with Lesson 6, is devoted to gravity water heating. This will be followed in due course by sections on radiators and radiation, gravity steam heating, steam and water boilers and cost estimating.

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Lesson No. 9—Application of the Down-Feed Water Heating System

By Ara Marcus Daniels

IN THE preceding lesson, the principle of the down-feed water heating system was presented and discussed. It is important that full consideration be given this system of heating since it offers a solution for many problems where an owner may insist on a water heating plant because of its flexibility.

There is a feeling among many in the heating trade that the application of gravity water heating should be limited to buildings of only moderate size, preferably square in shape or but slightly oblong. To attempt to heat a building that does not fall in this rather restricted class with a gravity water heating system is considered by many to be a harbinger of trouble and argues in favor of steam or a forced hot water job.

In a locality where the outside temperature may be chilly for long periods during the Spring and Fall, the so-called "flexibility" of a water heating system has much to commend it. It is often possible in the case of a properly-designed and installed gravity water heating system to maintain the desired inside temperature of say, 68° or 70° F. by carrying the water in the radiators at no more than 100° to 120° F. On the other hand for low winter temperatures, the temperature of the water may be carried at 180° to 200° F., although it is in the interest of economy and good design to figure on the temperature of the supply to radiators at 180° F. and the return therefrom at 160° F.

The application of a down-feed gravity water heating system to a long low building having two floors above the basement and consisting of many private rooms on two sides of a long lengthwise corridor is shown in Figure H-4-1. This layout has been adapted from an actual installation in a building about 175 ft. long by about 40 ft. wide, situated at a relatively high elevation where temperatures as low as 35° to 40° F. below zero may occur several times during a winter with 20° F. below zero taken as the basis of design.

As shown in Figures H-3-3 and H-3-4 (of the previous lesson) a main riser is carried from the boiler to the high point (marked K) of the circulating system. An expansion line is run from point K to the bottom of an expansion tank located at an elevation higher by a few feet.

The overhead mains are then run in an attic space and are graded downwards towards the last radiator served. At point L, one branch is taken

(*Copyright 1925 by Ara Marcus Daniels.*)

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The overhead mains are then run in an attic space and are graded downwards towards the last radiator served. At point L, one branch is taken

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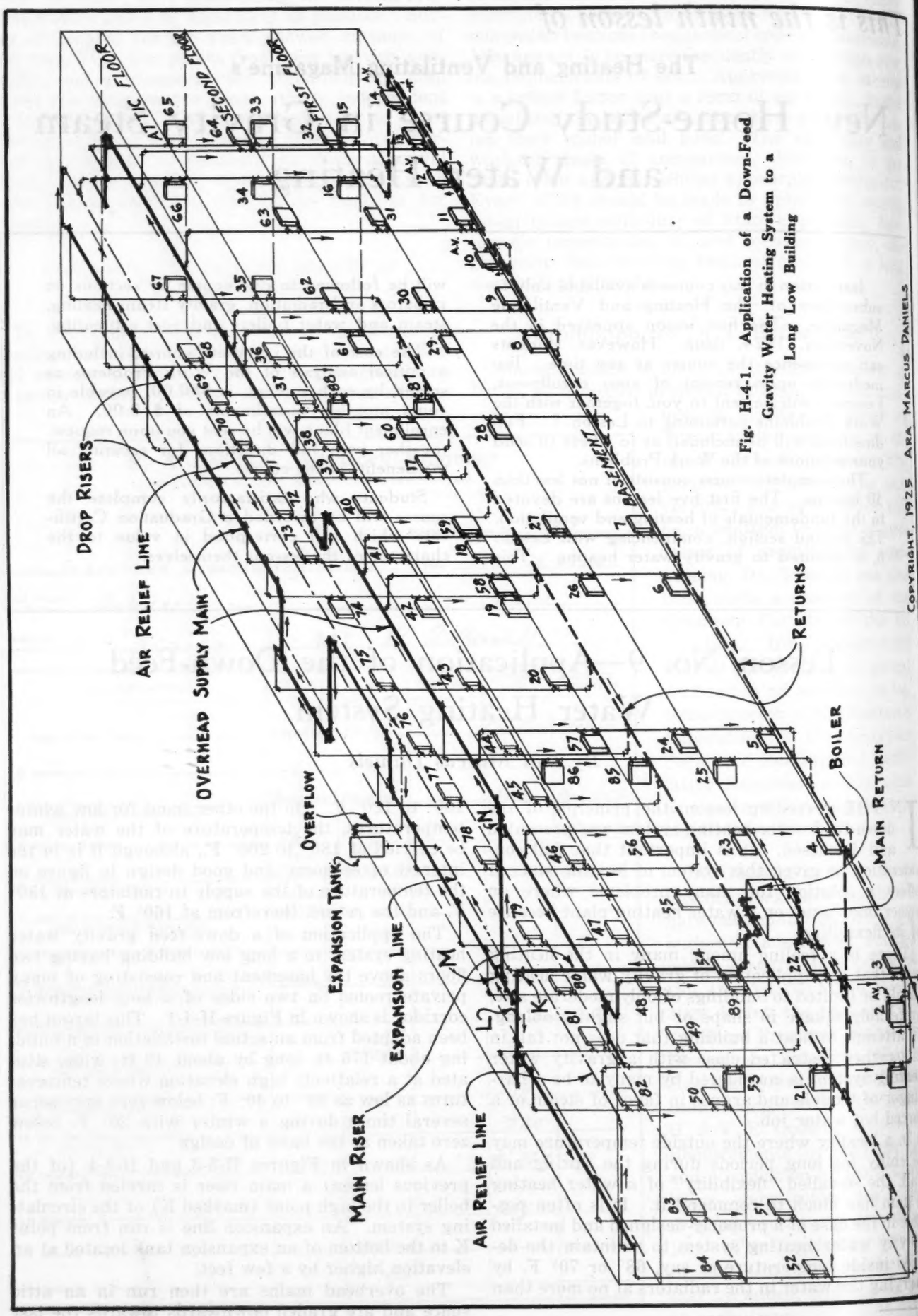

Fig. H-4-1. Application of a Down-Feed Gravity Water Heating System to a Long Low Building

off one end of the T and at point M the main divides into two equal-size branches. The branch on the near side of the building again branches at point N. Drop risers are taken from the main at different points to supply the radiators shown. The radiators and drop risers on the near side of the building are drawn with slightly heavier lines than those on the far side so that the connections to the drop risers may be more easily distinguished.

All drop risers near the center of the supply runs are taken from the mains as shown in Detail 1 of Fig. H-4-2. Each drop riser is made the same size throughout its entire length. After supplying the radiators, the bottom of the riser is led into the return line. The returns are carried in trenches below the basement floor and finally brought together into a main return which enters a return header at the boiler.

OVERHEAD MAINS—AIR ELIMINATION

In down-feed water heating systems the mains should always pitch down from the high point of the main vertical riser to the last drop riser, as illustrated in Detail 1 of Fig. H-4-3. The attic space in the building of Fig. H-4-1 was such as to permit the installation of the mains in this manner. A single down-pitch in two directions from the high point of the main riser makes it only necessary to vent the air from the extreme ends of the main. The expansion line connects the high point of the main riser to the bottom of the expansion tank and

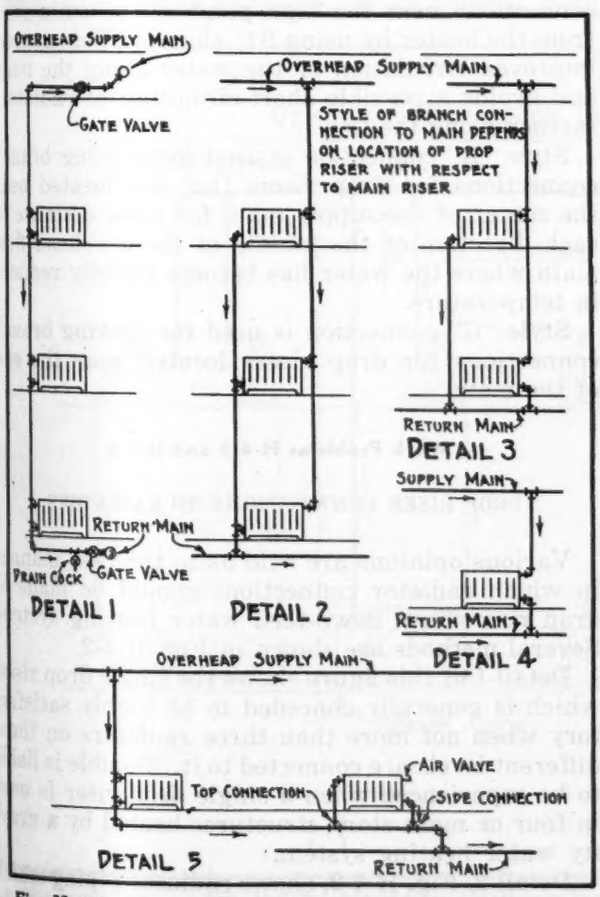

Fig. H-4-2. Drop Riser and Radiator Connections for Down-Feed Gravity Water Heating System

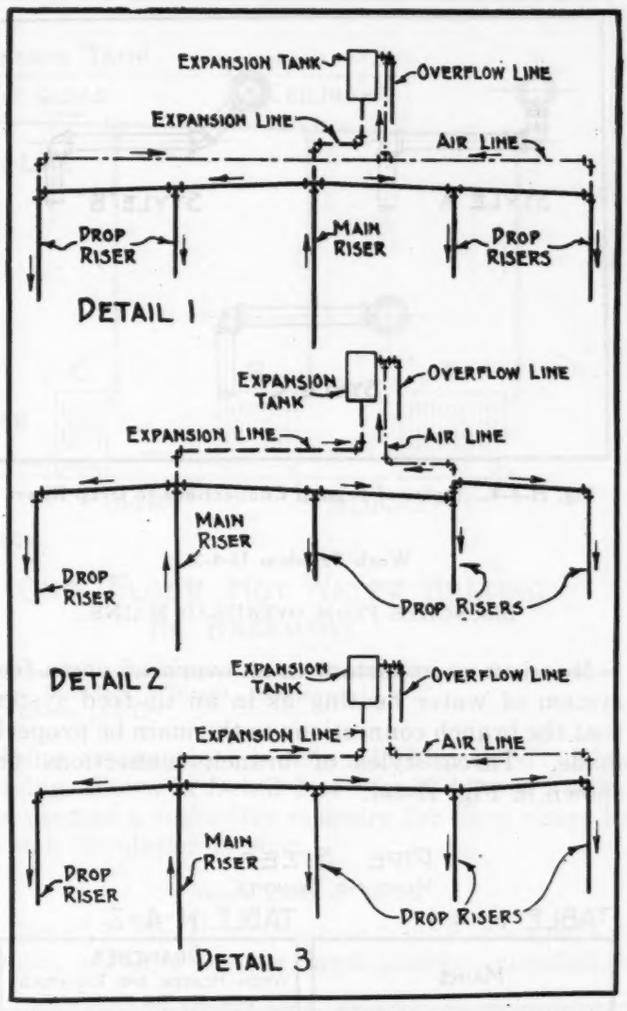

Fig. H-4-3. Runs of Overhead Mains for Down-Feed Gravity Water Heating Systems

not only provides an outlet for excess water due to expansion, but also for the air which flows out of the radiators up the drop risers into the overhead main and thence out through the expansion-line connection.

The air line, shown in Detail 1 of Fig. H-4-3, is not generally installed but in the case of a long, low building of this type, such a line assists in removing the entrapped air and permits a cold system to warm up more quickly. It should be noted that the air line is connected to the overflow pipe rather than into the expansion line. This is done in order to avoid any circulation of water through the air line with a resulting unnecessary heat loss. Naturally the air line will be full of water up to the water level in the expansion tank.

Work Problem H-4-1

When overhead mains are installed in attic space where lack of head room makes it necessary to step up the main, illustrated in Detail 2, Fig. H-4-3, or to change the direction of pitch, as illustrated in Detail 3, Fig. H-4-3, air lines must be provided to relieve the system. Such air lines are shown in the details mentioned.

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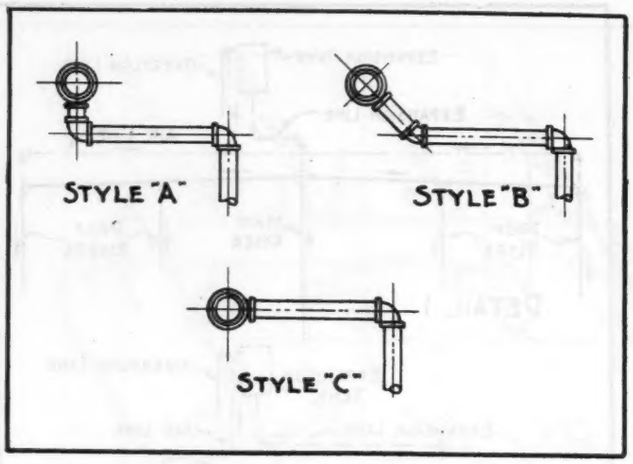


Fig. H-4-4. Styles of Branch Connections to Drop Risers

Work Problem H-4-2

BRANCHES FROM OVERHEAD MAINS

It is just as important in an overhead down-feed system of water heating as in an up-feed system that the branch connections to the main be properly made. Three styles of branch connections are shown in Fig. H-4-4.

PIPE SIZES
MAINS AND BRANCHES

TABLE H-4-1

MAINS		
No. Sq. Ft. of Radiation	Size Pipe Required	
	First Floor	Second Floor
1	2	3
Up to 150	1¼"	1"
151 to 250	1½"	1¼"
251 to 400	2"	1½"

TABLE H-4-2

BRANCHES WHEN HEATER AND RADIATORS ARE ON THE SAME FLOOR	
No. Sq. Ft. of Radiation	Size of Pipe Required
1	2
Up to 30	¾"
31 to 80	1"
81 to 150	1¼"

TABLE H-4-3

BRANCHES WHEN RETURN FROM SECOND FLOOR RADIATOR FEEDS FIRST FLOOR RADIATOR	
No. Sq. Ft. of Radiation	Size of Pipe Required
1	2
Up to 45	¾"
46 to 120	1"
121 to 225	1¼"

TABLE H-4-4

BRANCHES WHEN RETURN FROM SECOND FLOOR RADIATOR FLOWS INTO RETURN MAIN ON FIRST FLOOR.	
No. Sq. Ft. of Radiation	Size of Pipe Required
1	2
Up to 30	½"
31 to 60	¾"
61 to 160	1"

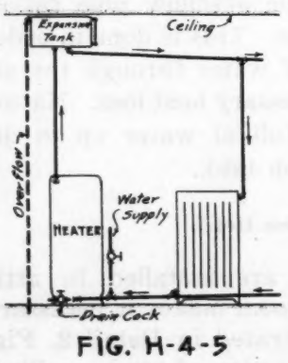


FIG. H-4-5

Fig. H-4-5. Typical Down-Feed System for One-Story Installation

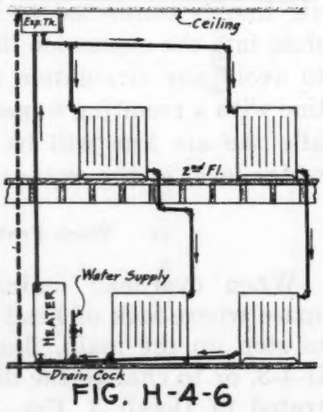


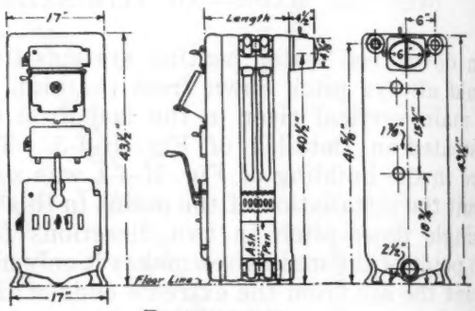
FIG. H-4-6

Fig. H-4-6. Typical Down-Feed System for Two-Story Installation

HEATER CAPACITIES
TABLE H-4-5

No. of Heater	No. of Sections	Rating: Square Feet of Direct Radiation			Fuel Capacity Pounds	Width Inches	Length Inches (over sections)
		Nominal	In addition to piping and heater surface: With Hard Coal	With Soft Coal			
1	2	3	4	5	6	7	8
1	4	200	135	100	60	17	12
2	5	300	200	150	80	17	15
3	6	400	265	200	100	17	18
4	7	500	330	250	120	17	21
5	8	600	400	300	140	17	24

NOTE:- In figuring the square feet of radiation required for a room in which the heater stands, allow for the heater itself about 20 square feet for No. 1 and 5 square feet additional for each size larger.
Flow and return pipe tapping, 2 inches.
Smoke pipe connection, oval, 6 inches longest dimension



DIMENSIONS

Style "A" connection is used for making branch connections near the high point of the main riser from the heater by using 90° elbows. This assures improved circulation of the water along the main and avoids a possible short-circuiting of radiators farther along the line.

Style "B" connection is used for making branch connections for drop risers that are located near the center of the supply main for some distance in each direction of the middle of the overhead flow main where the water has become slightly reduced in temperature.

Style "C" connection is used for making branch connections for drop risers located near the end of the main.

Work Problems H-4-3 and H-4-4

DROP RISER CONNECTIONS TO RADIATORS

Various opinions are held as to the best manner in which radiator connections should be made to drop risers in a down-feed water heating system. Several methods are shown in Fig. H-4-2.

Detail 1 of this figure shows the single drop riser, which is generally conceded to be highly satisfactory when not more than three radiators on three different levels are connected to it. Trouble is liable to be experienced when a single drop riser is used in four or more story structures heated by a gravity water heating system.

Detail 2, Fig. H-4-2, shows radiator piping which undoubtedly affords more positive circulation. In proportioning the drop pipes, a reduction is made

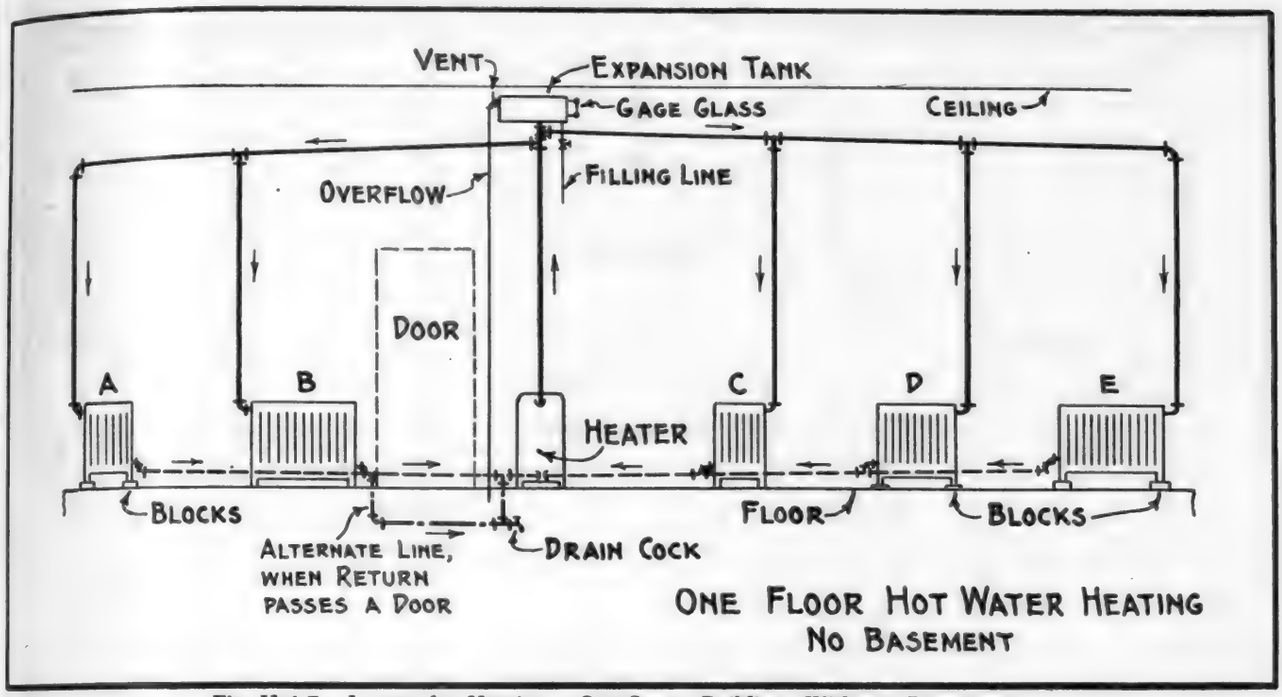


Fig. H-4-7. Layout for Heating a One-Story Building Without Basement
(Used with assigned Problem H-4-12).

on the supply side to care for the reduced radiation supplied while the riser on the return side is increased as the lower radiators empty into it. It is believed by some that it is advisable also to connect the bottom of the supply side to the return main with a small pipe so as to assure circulation through the riser in case all radiators are equipped with valves, all of which at times may be closed. Such piping arrangement is shown in Fig. H-1-7. This piping, shown in Detail 2 of Fig. H-4-2, may often be used as a corrective measure for drop risers in which circulation is poor.

Work Problem H-4-5

Detail 3, Fig. H-4-2, shows a piping arrangement which perhaps assures most positive circulation

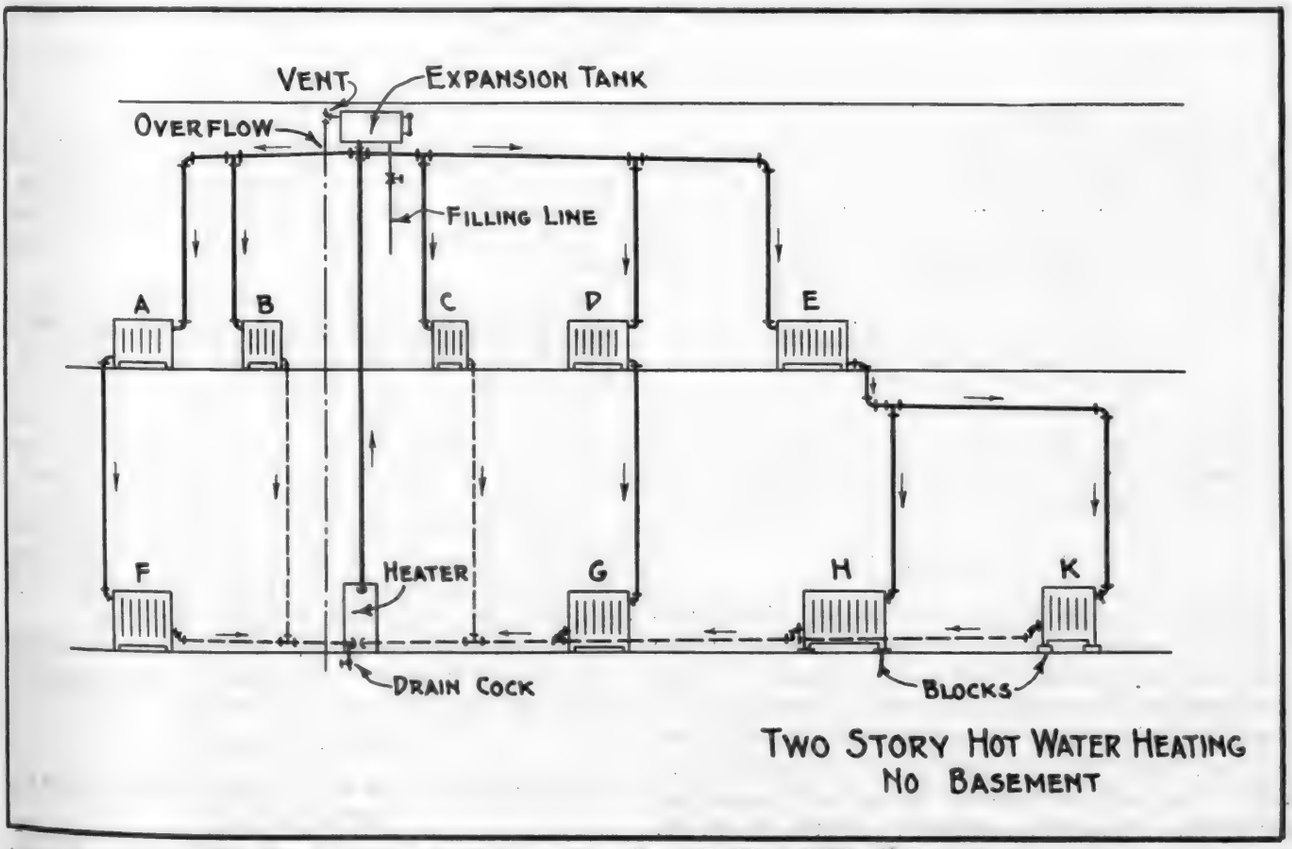


Fig. H-4-8. Layout for Heating a Two-Story Building Without Basement
(Used for assigned Problem H-4-13).

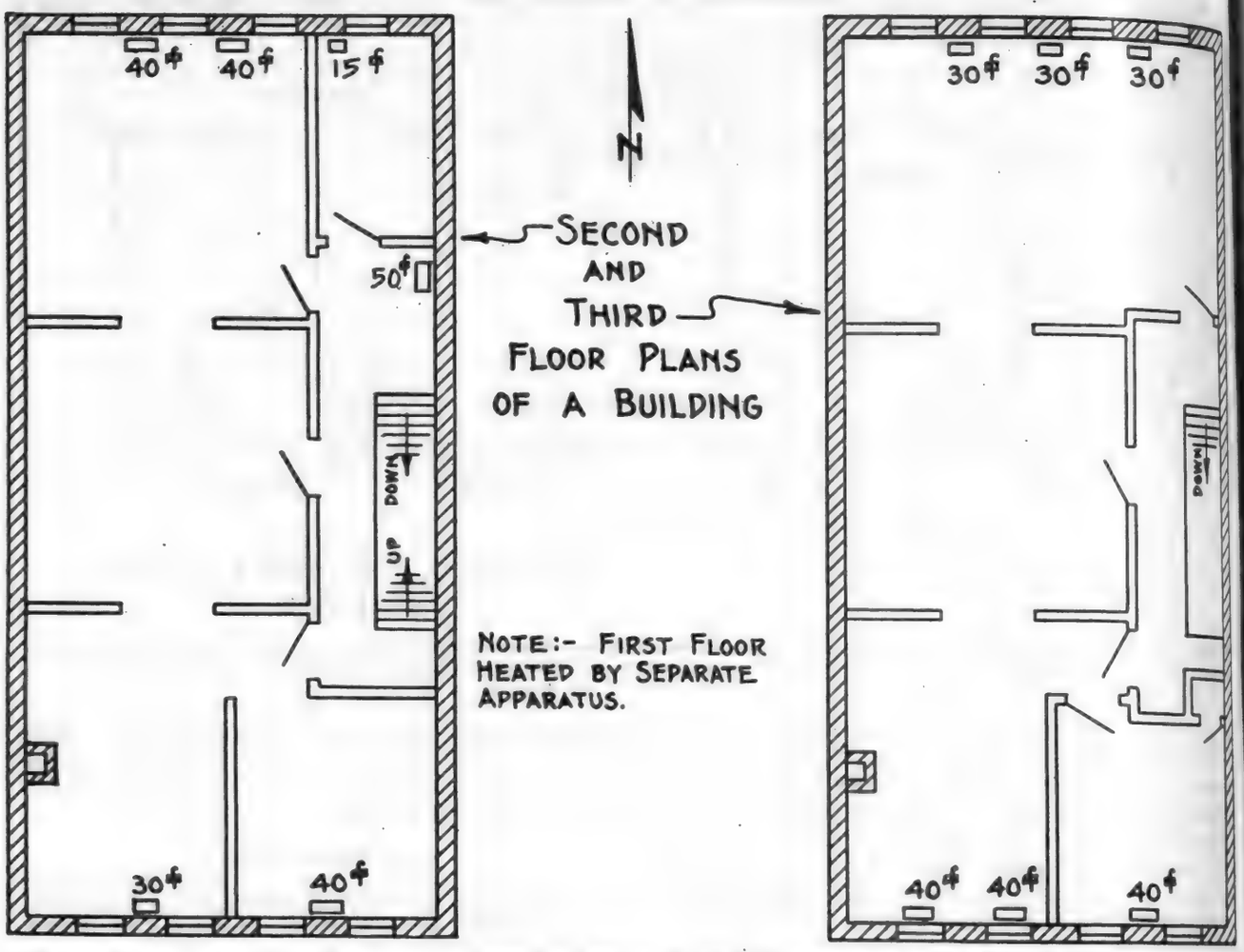


Fig. H-4-9. Plans of the Upper Floors of a Building for Which a Piping Diagram is to be Prepared and Heater Selected. Lower Floor Separately heated.
(Used with assigned Problem H-4-14).

through two radiators on different levels supplied by a single drop riser. With this arrangement, the full size of the drop riser is carried to the radiator and connected into the top with the same-size pipe used as a return connection to the return main. The return from the upper radiator is made to suit the radiation supplied.

Work Problem H-4-6

Detail 4, Fig. H-4-2, shows the usual method of connecting one radiator on a drop riser from an overhead main. When desired, the return connection can be made on the opposite side to the supply.

Work Problem H-4-7

Detail 5, Fig. H-4-2, shows a method of connecting two radiators to one drop riser when the radiators are located on the same level. In this arrangement the supply side of the second radiator should be taken from the top of the horizontal run and the return led into the side of the tee horizontally. The second radiator served will require an air valve. Radiators numbered 1 and 2, 9 and 10, 11 and 12, and 13 and 14 in Fig. H-4-1 are connected in this manner.

Work Problem H-4-8

In Fig. H-4-1, certain details of installation, such as the style of branch connection, gate valves, etc., are omitted for the sake of clearness. The following should be observed in planning a system of this kind:

It is advisable to equip each drop riser with a gate valve at both top and bottom and with a drain connection placed inside of the lower valve. See Detail 1, Fig. H-4-2. Thus any drop riser may be emptied for repairs or changes without interfering with the balance of the system. Also, the upper valve may be used to throttle the flow if necessary. Air valves are often placed at or near the top of the drop riser in order that air may be admitted without disturbing a union elbow to assure free flow of the water when both gate valves are closed and the drop riser and radiators drained.

The radiator connections in Fig. H-4-1 are made with swing branch connections where it may be advisable to provide for expansion.

Work Problem H-4-9

APPLICATION OF THE DOWN-FEED SYSTEM TO SMALL INSTALLATIONS

The principle of the down-feed system of water heating has been applied with remarkable success

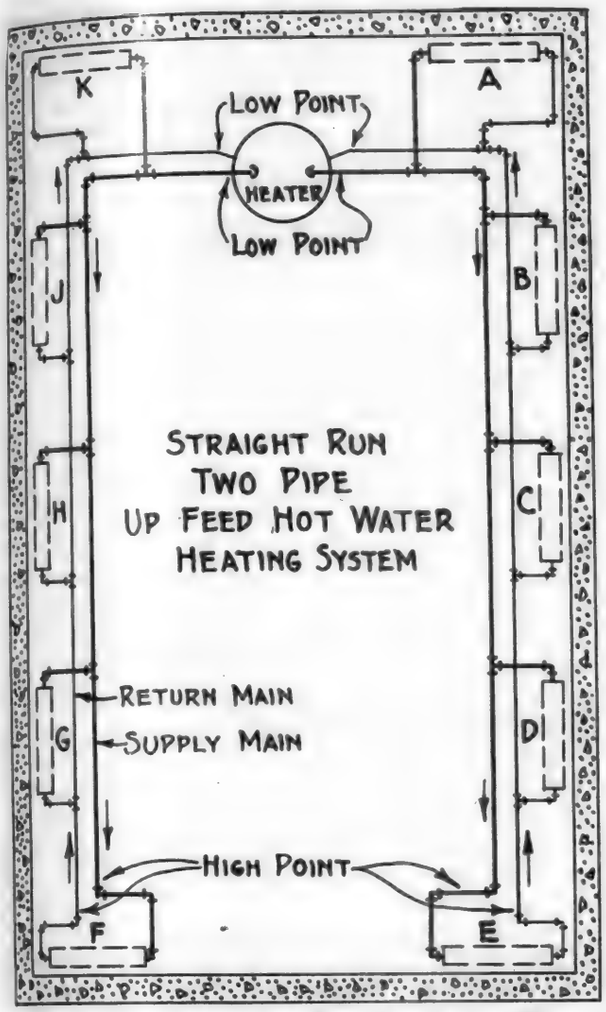


Fig. H-4-10. Straight Run Two-Pipe Up-Feed Water Heating System

to one and two-story installations without basement.

The typical manner of installing a one-story job is illustrated in Fig. H-4-5; a two-story job in Fig. H-4-6. The expansion tank should be located at the highest point of the system. The main supply from the heater is carried directly to the expansion tank from which is taken the supply main for supplying drop risers to the radiators which are piped as indicated in the figures. Sometimes the connections for the supply mains are made as shown in Figs. H-4-7 and H-4-8.

It is important that all piping be properly proportioned if best results are to be secured. The sizes depend upon the location and size of the radiators with respect to one another and to the heater supplying them.

The data in Tables H-4-1, H-4-2, H-4-3 and H-4-4, recommended by the manufacturer of a heater specially built for this type of system, have been used repeatedly by the author with excellent results. While radiators and radiation are covered in detail in a later lesson, it is well to remind the student that when using this down-feed system for a one or two-story installation, with the heater on the same level as some of the radiators, better results will be obtained if all radiators used are not less than 38 in. high.

The capacities and dimensions of a heater suited to this system as marketed by one manufacturer are illustrated and given in Table H-4-5 and sketch directly below. The length and depth of the heater will depend upon the number of sections comprising the heater. The side view in Fig. H-4-9 shows a heater of five sections. Two interior sections

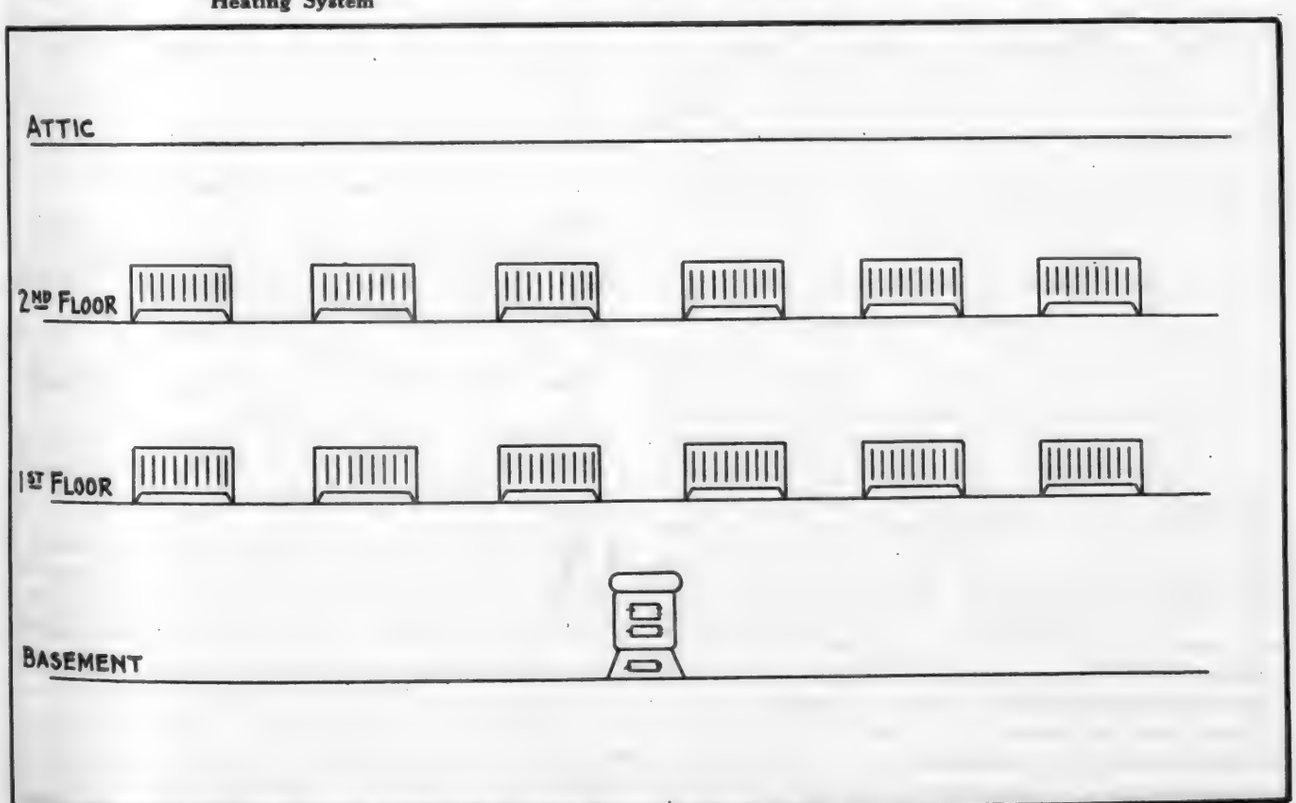


Fig. H-4-11. Radiators and Heater to be Piped up for Heating by Four Different Water Heating Systems. (*Used with assigned Problem H-4-15*).

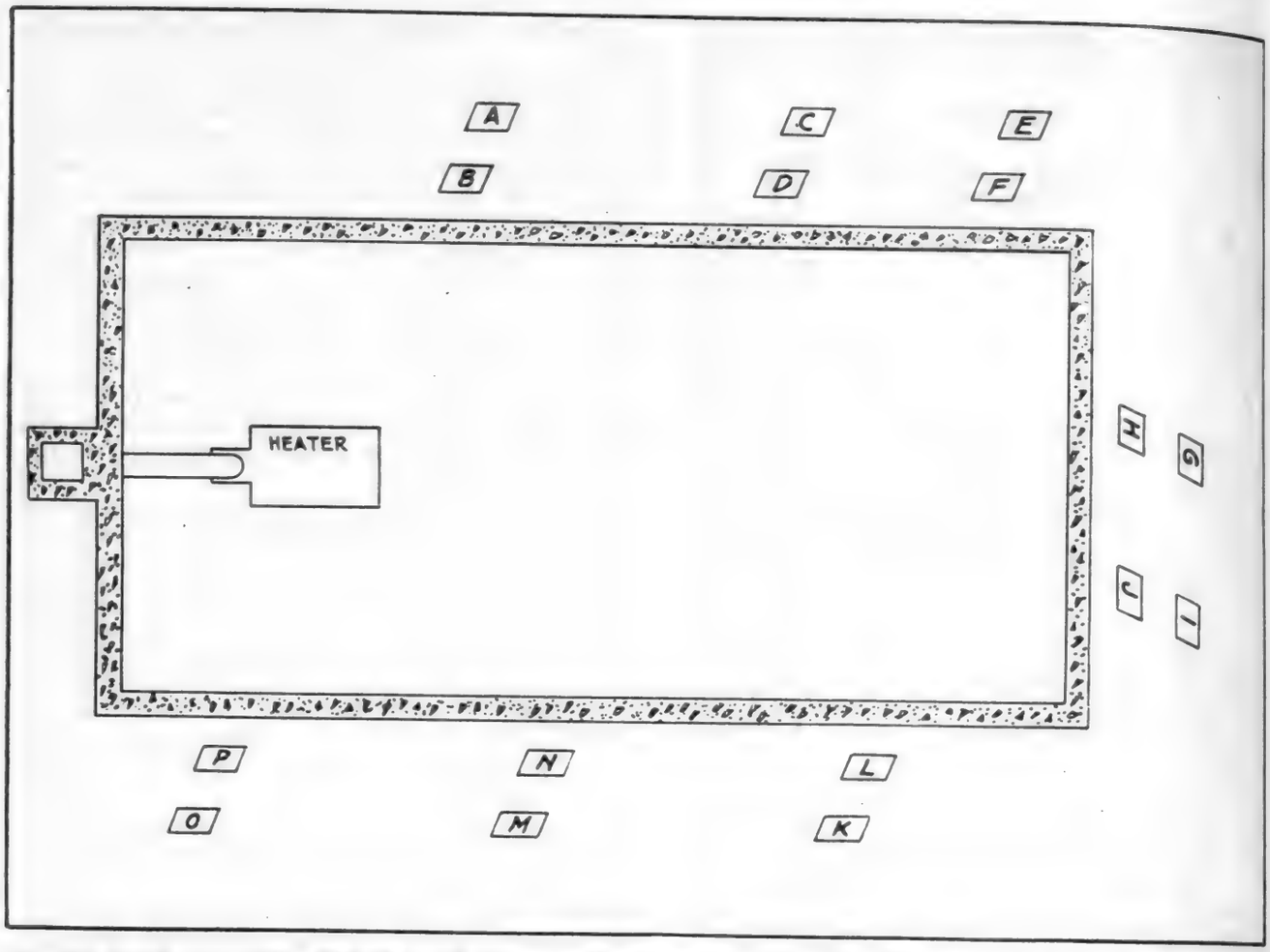


Fig. H-4-12. Basement Plan With Sixteen Radiators on Two Floors for Which Two Different Water Heating Systems are to be Designed

(*Used with assigned Problem H-4-16*).

have been partly removed to show the location of grate, ash-pit and interior heater section. These heaters may be obtained with from four to eight sections inclusive. The square feet of direct radiation which they will supply is given in Table H-4-5. The note directly below this table should be observed when making a selection.

Work Problems H-4-10, H-4-11, H-4-12, H-4-13, H-4-14

STRAIGHT-RUN TWO-PIPE UP-FEED SYSTEM

Perhaps the most usual type of water heating system installed in residences is a straight-run system having usually two supply and two return mains. A typical layout is shown in Fig. H-4-10.

A study of the length of water travel to each of the radiators shows that it differs for each radiator on a run. In many installations this may not be particularly objectionable. In a case, however, where the last radiators served are located on the north side of the building, it may result in lack of sufficient heat being carried to them unless the radiators are increased in area to compensate for the lower average temperature carried therein. It should be noted in connection with Fig. H-4-10 that the length of water travel through radiators A and K is short, while that through radiators E and F is relatively long. A comparison of the length of water travel to and from each radiator shown in Fig. H-4-10 with that to each of the radiators shown in Fig. H-1-11 clearly shows the advantage possessed by the run illustrated in Fig. H-1-11.

Work Problems H-4-15 and H-4-16

The fifth lesson of the water heating section (Lesson 10) to appear next month, will include the circuit system, expansion tanks for water heating systems and the closed type of system.

The Value of Fans in Furnace Heating

By C. G. Buder

(From a Paper Presented at the Semi-annual Meeting of the American Society of Heating and Ventilating Engineers in Atlantic City, June 15-17, 1925)

WHEN a furnace is placed in a casing and heated, the air within the casing expands and thus becomes lighter per cubic foot than the air without and air motion is produced. This is known as gravity circulation. The amount of air that can be displaced is a direct function of this difference in temperature. It can be readily seen that as the demand for heat becomes greater there must be a rise in temperature at the register.

In a well designed gravity installation, the maximum allowable temperature at the register is about

180°, or a difference of 110° from the desired room temperature of 70° F. This difference of temperature will cause the air to stratify in the room and while not objectionable in buildings with low ceilings, it is very objectionable in buildings with high ceilings, such as churches and theaters.

Where a fan is used in connection with the furnace, a larger volume of air can be delivered at a lower temperature diminishing the possibilities of stratification.

For example, suppose a building requires 2000 cu. ft. per minute to be recirculated at a register temperature of 110° above room temperature. The B.T.U. requirement would be $\frac{2000}{55} \times 110$ or 4000 B.T.U. per minute. If this volume could be increased to three times 2000 cu. ft. per minute or to 6000 cu. ft. per minute, a temperature rise of only 36.6° would be required.

An actual tests of a building having a ceiling height of 35 ft. showed a temperature of 63° at the floor and 98° at the ceiling when operating as a gravity system, a difference of 35° or an average of 1° per foot. The fan was then run for an hour and the temperature showed 70° at the floor and 77° at the ceiling or a difference of 7° or 0.5° per foot.

In addition to preventing stratification the fan helps to insure better distribution to all parts of the building and thus helps to prevent air stagnation.

The transfer of heat between a hot metal and the surrounding air depends upon the velocity of the air over the surface of the metal. This is due to the insulating effect of a more or less stationary film of air next to the surface. This film of air offers considerable resistance to the flow of heat, known as the surface resistance. The surface resistance is affected by the character and roughness of the surface and the velocity of the air over the surface. The moving air tends to break up this insulating film and decrease its thickness and insulating effect. With the higher air velocities over the surface of the furnace, attained by forced circulation, the insulating effect of this film of air is decreased and the heat transfer, for the same temperature difference between the furnace and air in the casing, is increased.

The rate of heat transfer from one body to another depends upon the difference in temperature. The fan by increasing the volume of air handled produces a lower air temperature inside the casing, a greater heat transfer is therefore made possible and higher efficiency is realized. Hence, the efficiency of a furnace is increased doubly by forced circulation, *First*, due to the decreased surface resistance caused by the greater air velocity and, *Second*, due to the greater difference in temperature between the furnace and the surrounding air.

When a furnace is operated as a gravity system, the motive power causing air motion over the furnace is supplied by the increase in temperature of the air itself, hence, the air next to the furnace, being most heated, rises more rapidly than the air near the casing wall. This is a condition which is desired. With the application of a fan there is no great tendency for a maximum air velocity over the furnace and baffling becomes necessary to gain this end, hence a furnace with fan offers a field for careful design in arranging such baffles in order to produce the best results.

There are four requirements for an ideal fan for use in producing forced circulation in a warm air furnace: *First*, maximum capacity, *Second*, minimum power consumption, *Third*, quiet operation, *Fourth*, freedom for air flow. In other words the fan must not obstruct the passage of air when it is not in use thereby permitting the furnace to be operated as a gravity system when desired.

In order to gain appreciable advantage over the gravity system in the matter of increased heat transfer due to high velocity over the furnace and low air temperatures the fan should be able to supply at least three times the quantity of air circulated with the gravity system. Fans with high tip speeds are generally noisy so in order to avoid annoyance from this source, fans of low tip speed should be used.

Perhaps the most difficult problem is to find a fan that does not obstruct the air passage when it is not in operation. There are many standard makes of fans that operate silently and have sufficient capacity but they usually require hand operated or automatic by-passes in order to allow the furnace to operate as a gravity system. The failure to have these by-passes operated at all times when running as gravity systems may result in damage to the plant.

In the installation of heating plants economy of operation must be taken into consideration as well as ability to function properly. Care should be taken that the maximum air delivery is given for the power required. A fan especially designed for furnace work has a quiet operating speed and will produce four times the gravity volume. The free area through the wheel is as great as the area of the duct it is designed to be attached to and the power consumption is low. These fans are made in three sizes, the largest having wheels 24 in. in diameter, handling 7000 cu. ft. per minute against 0.25 in. static pressures with a little less than 1 H.P. All sizes are made to fit 24-in. ducts.

INCREASED CAPACITY.—It has been proven that by increasing the air volume and fuel consumption, an increase of capacity three times that of normal operation can be obtained without damage to the furnace. This gives the fan and furnace combination a flexibility that is hard to equal.

ADAPTABILITY.—The fan furnace system is adaptable to the use of all open type buildings, schools, churches and homes. Its development has tremendous possibilities and the future holds promise of the ideal in furnace heating when this apparatus is coupled with air-washers, filters and other air conditioning apparatus all automatically controlled.

Progress of House Heating by Gas in Chicago

By Glenn C. Carnahan

Superintendent House and Water Heating Department, The Peoples Gas Light and Coke Company, Chicago, Ill.

2. What it Costs to Heat with Manufactured Gas

(Presented at the Twentieth Annual Convention, Iowa District Gas Association, Cedar Rapids, Ia., April 22-24, 1925)

A HOME usually retains enough heat to be comfortable when the outside temperature averages 60° F. for the day. Artificial heat is needed only when the daily average drops below 60° F. From the report of the United States Weather Bureau, we find that the daily average temperature for Chicago is below 60° F. normally between October 7 and May 18, and the normal or average heating season for Chicago is, therefore, a period of 225 days. We also find from these reports that the average temperature for this period is 38.9° F.

We assume that the average home will be kept at 70° F. for 16 hours of the day, and at 55° for 8 hours of the day. We find that the number of hours the homes are kept at 70° F. is 224 x 16 or 3,584 hours and at 55° the number is 224 x 8 or 1,792 hours during the heating season.

Since the amount of heat required is proportionate to the temperature difference between the inside and the outside of the home, as well as to the length of time the heat is required, we estimate the amount of heat required by means of degree-hours. Degree-hours is the product of the difference between the inside and outside temperatures of the home in degree Fahrenheit times the number of hours heat is required.

The difference between an inside temperature of 70° F. and the average outside temperature of 38.9° F. for the heating season is 31.1° F. This average temperature difference is maintained for 16 hours of the day. The average night temperature difference between 55° and 38.9° is 16.1°, which is maintained for 8 hours during the night. The total degree-hours for Chicago will then be 3,584 x 31.1, equalling 111,462.4 plus 1,792 x 16.1, equalling 28,851.2, which is 140,313.6 degree-hours.

This figure of 140,313.6 degree-hours, if multiplied by the hourly B.T.U. loss of a building per degree difference between inside and outside temperatures, will equal the total heat loss per season, that must be replaced by artificial means in climatic conditions equal to Chicago.

Since it is customary in many cases to calculate the hourly B.T.U. loss from a building on a basis of 70° F. difference between the inside and outside temperature, then by dividing 140,313.6 by 70, gives us a figure of 2,004, which multiplied by the hourly heat loss, calculated on the basis of a 70° F. difference, also equals the total heat loss per season. If the B.T.U. loss is figured on 70° F. inside and minus 10° F. outside then the figure of 140,313.6 will be divided by 80, which will give the multiplier of 1,754, which should be used when figures on radiation are based on minus 10° F. outside temperatures.

Similar constants can be worked out for any climatic condition other than those corresponding to Chicago by use of the U. S. Weather Bureau reports.

The cubic feet of gas required per season will be yearly B.T.U. loss ÷ B.T.U. per cubic feet X efficiency of heating plant equals the cubic feet of gas consumed per season.

The cost of gas per season in dollars will equal the cubic feet of gas required per season times the price of gas in dollars per cubic foot.

GAS CONSUMPTION FOR HEATING IN TYPICAL HOMES

The examples (see Page 63) taken from Chicago heating accounts show what the gas consumption was for typical homes. The gross B.T.U. of the gas was 535, and the heating season was 1923-1924.

KEEPING CUSTOMERS SOLD ON SERVICE

Keeping customers satisfied with their gas bills, depends first of all on making estimates at the time the equipment is sold that are reasonably accurate and, secondly, on teaching customers to understand the variation of the monthly bills with the weather conditions.

In a previous paragraph the system of calculating the season's cost was explained. However, we supplement that system in selling by hand-books showing pictures of homes in connection with actual gas bills for these homes, similar to the typical examples mentioned previously. The monthly costs are shown in dollars and cents, as well as cubic feet. This method gives the customer a chance to check our calculation by actual comparison with the cost of heating a home similar to his. It also prepares him for the large bills that come after a period of cold weather. However, most first year users must be assured several times during the first winter that they are coming out all right as to cost. We must also have a system of checking costs against estimates before the year is up. Accordingly we are using a checking system by which the season's bills can be checked, from month to month, with a high degree of accuracy.

GAS CONSUMPTION FOR TYPICAL CHICAGO HOMES, SEASON 1923-1924

(Gross Heating Value of Gas, 535 B.T.U. per Cubic Foot)

	Length of Heating Season	Gas Consumed Cu. Ft.	Cost
Brick Bungalow Exposed, 5 Rooms, 421 sq. ft., Hot Water, No. 4-C-3 Bryant Heater	Sept. 13—June 16	257,800	$200.73
Frame Bungalow Exposed, 6 Rooms, Warm Air, No. 815 Columbus Furnace	Oct. 3—May 22	285,800	220.69
Stucco Bungalow Exposed, 5 Rooms, Warm Air, No. 815 Columbus Furnace	Oct. 13—May 22	279,200	214.54
Frame Bungalow Exposed, 5 Rooms, 400 sq. ft., Hot Water, No. 4-C-3 Bryant Boiler.	Oct. 25—May 28	357,000	273.49
Two-story Frame House Exposed, 5 Rooms, 250 sq. ft. Water, No. 24-C Bryant Boiler.	Oct. 4—June 16	240,200	228.36
Two-story Brick Partly Exposed,6 Rooms, 550 sq. ft. Water, No. 4-C-3 Bryant Boiler.	Oct. 5—June 5	435,600	333.48
Two-story Frame Exposed, 5 Rooms, 333 sq. ft. Hot Water, No. 4-C-3 Bryant Boiler.	Nov. 7—May 29	219,200	169.95
Brick Bungalow—One Side Not Exposed Much, 5 Rooms, 282 sq. ft. Hot Water, No. 4-C-3 Bryant Boiler	Oct. 24—June 12	281,800	217.61
Two-story Frame Residence—Partly Shielded, 6 Rooms, 535 sq. ft. Hot Water, No. 5-C-3 Bryant Boiler	Oct. 23—June 4	233,200	180.94
Brick Bungalow Exposed, 6 Rooms and Garage, 650 sq. ft. Hot Water, No. 6-C-3 Bryant Boiler	Oct. 3—May 26	393,000	301.12
First Floor Brick Building, Well Shielded on Sides, 6 Rooms and Store, 400 sq. ft. Hot Water, No. 4-C-3 Bryant Boiler	Oct. 13—June 2	372,200	285.71
Brick Bungalow Exposed, 6 Rooms, Warm Air, No. 815 Columbus Furnace	Oct. 1—May 19	291,800	225.08
Two-story Brick Residence Well Exposed, 7 Rooms, 727 sq. ft. Hot Water, No. 6-C-3 Bryant Boiler	Oct. 5—June 4	383,800	350.81
Two-story Brick Residence Exposed, 7 Rooms, 400 sq. ft. Hot Water, No. 4-C-3 Bryant Boiler	Oct. 24—June 29	269,400	208.45
Two-story Brick Residence Shielded, 7 Rooms, 343 sq. ft. Steam, No. 4-S-3 Bryant Boiler	Sept. 12—June 13	262,800	204.48
Two-story Stucco Exposed, 7 Rooms, 552 sq. ft. Hot Water, No. 5-C-3 Bryant Boiler.	Oct. 4—June 3	367,800	282.41
Two-story Stucco Well Exposed, 7 Room House, 1000 sq. ft. Water, No. 54 Bryant Boiler	Oct. ..—June 3	640,400	486.70
Two-story Frame House Partly Exposed, 7 Rooms, 597 sq. ft. Water Rad., No. 5-C-3 Bryant Boiler	Oct. 3—June 3	395,800	303.41
Brick Bungalow Exposed, 8 Rooms, 708 sq. ft. Hot Water, No. 6-C-3 Bryant Boiler.	Sept. 13—June 5	488,400	373.18
Two-story Frame Residence Exposed, 8 Rooms, 480 sq. ft. Hot Water, No. 6-C-3 Bryant Boiler	Oct. 24—May 26	418,600	320.05
Two-story Stucco Residence Exposed, 8 Rooms, 700 sq. ft. Hot Water, No. 7-C-3 Bryant Boiler	Sept. 27—June 3	524,400	400.02
Two-story Brick Residence, One Party Wall, 8 Rooms, 678 sq. ft. Hot Water, No. 6-C-3 Bryant Boiler	Sept. 12—June 6	443,000	339.30
Two-story Frame, 8 Room Residence, Warm Air, No. 915 Columbus Furnace	Sept. 28—June 14	327,400	252.57
Two-story Brick Partly Exposed, 8 Room Residence, 878 sq. ft. Hot Water No. 6-C-3 Bryant Boiler	Sept. 28—June 16	665,600	508.23
Two-story Brick Residence Well Exposed, 8 Rooms, 1200 sq. ft. Water, No. 66-C Bryant Boiler	Oct. 24—June 16	586,600	446.26
Two-story Stone and Brick Party Walls, 8 Room Residence, 324' Steam, No. 5-S-3 Bryant Boiler	Oct. 19—June 3	425,400	325.61
Large Brick Residence Well Exposed, 12 Rooms, 572 sq. ft. Steam, No. 8-S-3 Bryant Boiler	Oct. 1—May 29	823,800	624.37
Large Brick Residence Well Exposed, 11 Rooms, 1144 sq. ft. Hot Water, No. 9-C-4 Bryant Boiler	Oct. 8—May 28	706,800	536.41
Large Two-story Residence Well Exposed, 14 Rooms, 1500 sq. ft. Hot Water, No. 11-C-4 Bryant Boiler	Sept. 5—June 11	1,092,600	827.09
Two-story Brick Residence Well Exposed, 13 Rooms, 1108 sq. ft. Water, No. 9-C-4 Bryant Boiler	Oct. ..—June 6	631,800	480.09
Three-story Brick and Frame Well Exposed, 23 Room Residence, 2515 sq. ft. Hot Water, No. 15-C-4 Bryant Boiler	Oct. 19—July 7	1,811,200	1,365.45
Two-story Brick Home Well Exposed, 10 Rooms, 700 sq. ft. Hot Water, No. 8-C-3 Bryant Boiler	Oct. 17—May 20	516,600	393.19
Two-story Brick Residence Well Exposed, 11 Rooms, 1200 sq. ft. Water, No. 66-C Bryant Boiler	Nov. 7—June 16	724,000	548.93
Three-story Stone and Brick Party Walls, 3 Floor House, 1450 sq. ft. Vapor, No. 114-S Bryant Boiler	Jan. 15—Dec. 9	870,200	660.55
Brick Buildings Near, 1-5 Room Flat, 400 sq. ft. Hot Water, No. 4-C-3 Bryant Boiler	Nov. 8—May 27	242,200	187.09
Two-story Stone and Brick, Party Walls on One Side, Two Flats, 5 and 6 Rooms, 884 sq. ft. Hot Water, No. 7-C-3 Bryant Boiler	Oct. 26—May 28	483,000	368.07
Two-story Brick Partly Exposed, 2-5 Room Flats, 786 sq. ft. Hot Water, No. 7-C-3 Bryant Boiler	Sept. 14—June 5	532,200	406.53
Two-story Brick Exposed, 2-5 Room Flats, 687 sq. ft. Hot Water, No. 8-C-3 Bryant Boiler	Oct. 1—May 29	496,400	378.86
Two-story Brick Exposed, 2-5 Room Flats, 875 sq. ft. Hot Water, No. 7-C-3 Bryant Boiler	Sept. 12—June 5	829,000	629.13
Two-story Brick and Stone, Two Flats, 5 and 6 Rooms, 1200 sq. ft. Water, No. 66-C Bryant Boiler	Oct. 30—June 30	684,600	518.89
Two-story Frame Building, 2-7 Room Flats, 500 sq. ft. Steam, No. 7-S-3 Bryant Boiler	Nov. 24—June 26	597,800	453.90
Brick Apartment Building Exposed, 2-7 Room Flats, 855 sq. ft. Hot Water, No. 8-C-3 Bryant Boiler	Sept. 26—June 6	611,600	465.59
Brick and Stone Apartment Building Exposed, 2-8 Room Flats, 1200 sq. ft. Hot Water, No. 9-C-4 Bryant Boiler	Sept. 26—June 6	636,400	488.69
One-story Brick Office Building Exposed, Offices, 824 sq. ft. Water, No. 7-C-3 Bryant Boiler	Sept. 7—June 4	464,400	356.43
Ground Floor of a Church, Brick-Exposed, 700 sq. ft. steam, 10 Gasteam Radiators.	Sept. 29—June 9	263,600	205.13
Two-story Brick Schoolhouse Exposed, Private School, 3834 sq. ft. Steam Direct, No. 150-S Bryant Boiler	Jan. 22—Dec. 22	2,159,200	1,628.42
Greenhouse, 670 sq. ft. Water, No. 5-C-3 Bryant Boiler	Sept. 24—June 23	581,000	446.57
Two-story Brick Partially Exposed, Store and 6-Room Flat, 870 sq. ft. Hot Water, No. 7-C-3 Bryant Boiler	Oct. 8—June 17	754,600	572.76

As explained before we are using 7000 degree-days as the equivalent of a normal heating season in Chicago. By taking the average temperature of each day of the heating season and by subtracting the average from 70, which is the temperature we figure to maintain in a home, the difference in degrees between inside and outside temperatures maintained for 24 hours or one day represents the number of degree-days covered by the 24 hours in question. This figure divided by 7000 is the fraction of the season heating requirements represented by the one day.

By determining the number of degree-days per month, that is, the month as represented by the periods between meter readings, we can tell the customer the period-by-period bills that will, in the aggregate, constitute his total bill for the heating season. This can be done with a high degree of accuracy except for the fall and spring months, when, due to wide variation of heat requirements and ventilation, considerable latitude must be allowed. This method is quite accurate for cold weather in spite of the fact that no correction is made for the effects of sunshine and wind velocity or direction.

The daily figures are kept up to date and each sales engineer keeps them in a note book. Bills then can be discussed intelligently and customers in general seem to understand and believe in the explanation.

All bills for gas used in central heating plants are checked by this method before they go to the customers. If the check shows that the costs are running much in excess of estimates a thorough investigation of the equipment, and the habits of the users are made.

The one most common cause for increased consumption of fuel is due to the fact that since the average outside temperature for the heating season in Chicago is 31.1° F. then each degree above 70 maintained in the home increases the fuel consumption 3.2%. Such facts when high temperatures are found are explained, and the customer uses his own judgment. However, most new customers are used to 75° F. to 80° F. house temperatures and they must become acclimated to 70° F. which usually occurs during the first season.

We have abandoned almost entirely any comparisons between the cost of gas, coal or oil for heating. We estimate the probable cost with gas and the customer then can make his own comparison.

For general discussion we speak of the probable amount of gas which would be used for home heating to be between 55,000 and 65,000 cu. ft. per room per season. This is quite obviously too inaccurate for anything but very general discussion, but we find it better than any comparison that can be made against coal or oil costs for home heating.

FUTURE OF GAS HEATING

Looking into the future, gas heating for homes looks very promising. The American public has always been willing to pay the price for the best. They have always been willing to be shown. They have always been eager to adopt new ideas and methods. They have always led the world in inventions. The degree of success that will come to gas heating will be the ability of the gas fraternity to deliver the goods.

A most interesting coincidence has developed as the result of analyzing the figures presented by Mr. Carnahan exemplifying the cost of gas heating in Chicago. If we add together all of the gas consumed on all the hot water jobs for the entire season and divide by the total rated load, we find that it required 706.8 cu. ft. of gas per square foot of radiation for the season of 1924-1925.

If now, we take the curve developed by the American Gas Association and shown in connection with an article entitled, "Practical Notes on House-Heating by Gas" in THE HEATING AND VENTILATING MAGAZINE for December, 1924, we find from this curve that the cubic feet of gas per square foot of installed water radiator per degree-day is 0.115. If this is multiplied by 6150, the number of degree-days in the Chicago territory for the heating season of 1924-1925, we find that theoretically there would be required 706.9 cu. ft. of gas for the season. Such remarkable checking is, of course, a coincidence and could not be expected as the usual thing. However, it clearly exemplifies the value of the data developed by the American Gas Association, and the accuracy with which gas consumption in any part of the country may be predetermined.

In connection with the figure of 7000 degree-days given by Mr. Carnahan, it should be pointed out that Mr. Carnahan has not taken standard figure of 65° basic temperature in determining his degree-days, but has assumed a figure of 70° which is undoubtedly too high, unless we are willing to assume that an inside daily temperature of 75° is desired. It would appear that the better plan would be to standardize the degree-day to the extent of basing it upon a mean outdoor temperature of 65° F., which, in the case of Chicago for the heating season of 1924—1925, would result in 6150 degree-days.

2000% Increase in House Heating with Gas

The increase in gas-fired house heating systems has averaged more than 2000% since 1919, says a statistical report just issued by the American Gas Association, which points out that the gas companies throughout the country, having passed through all the stages of development from a lighting to a heating business, are supplying gas for heating in the home as well as in industry.

"A summary of the percentage sales of the leading manufacturers of gas-fired house heating systems," according to the report, "shows that the biggest increases have come since 1921, which was a rather poor year. One of the largest concerns in this field made nearly 50,000 house heating installations last year alone, which for this company, was an increase of 6000 per cent over 1919.

"At the present time there are only two practical methods whereby automatic heating is possible, namely, by oil and by gas. As long as oil prices remain low, the oil furnace presents a certain economy of operation not attained by gas sold under existing rate schedules. But the tendency of gas rates for this purpose is generally downward, and there are so many features that render gas superior as a heating medium that the temporary difference in cost is more than equalized. Intensive selling campaigns instituted by some of the leading gas companies in the country are making these facts known to hundreds of thousands of consumers."

A Proposed Method for Comparison of Effectiveness of Indirect Heating Surfaces

By A. E. Stacey, Jr. and C. M. Ashley

(From a Paper Presented at the Semi-annual Meeting of the American Society of Heating and Ventilating Engineers, in Atlantic City, June 15-17, 1925)

THE necessity of a rational method for comparing the merits of different types of heating surfaces has been felt by all interested in the study and uses of indirect heaters.

It is the purpose of this paper to offer a simple system which can be used for comparison between indirect heating surfaces, based on the ratio of heat output to power input.

Heat transmission, neglecting radiation, between a surface and a fluid is the result of the diffusion of the fluid near the surface. This may be of two types, one as in viscous flow where the heat is transferred by conduction from one layer in the fluid to the next and the other as in turbulent flow where masses of the fluid form the interior of the fluid are brought near the surface. However, there remains in this case a thin film at the surface in laminar or viscous movement which offers the main resistance to the passage of heat. The heat transfer is thus much more rapid in the second case than the first due to a greater and more intimate contact between the body of the fluid and the surface.

It is well to note the similarity between this phenomenon and that of resistance to the flow of a fluid through a tube. At low velocities the flow is viscous and the resistance varies as the first power of the velocity; the critical velocity is reached when the parallel motion is broken down and a turbulent motion is introduced. This naturally causes a large increase in the resistance in relation to the velocity and in the case of simple tubes the exponent of the velocity is approximately 1.82. In the case of ideal impact of a fluid against a surface, the resistance would vary as the square of the velocity.

It has been shown by Coffey and Horne, Carrier and later by Himus and Hinchley that the transmission from a surface parallel to the flow of air is approximately one-half of that from a surface at right angles to it, or in other words the heat transmitted by true impact is twice that of pure parallel flow. On this basis heaters could be divided into three classes *a*—those with surfaces parallel to the flow of air; *b*—those with the surfaces perpendicular to the flow of air; *c*—a combination of *a* and *b*. Evidently any system of comparison must be fair to all arrangements of surfaces and offers a means of judging the performance of all types of heating surfaces under conditions of different velocities and different arrangements of surface. From an engineering standpoint the comparison should be on a basis that can be easily transferred into dollars and cents or the cost in power to produce a definite number of B.T.U. under known conditions. It is with these facts in mind that the authors propose the following system of comparison:

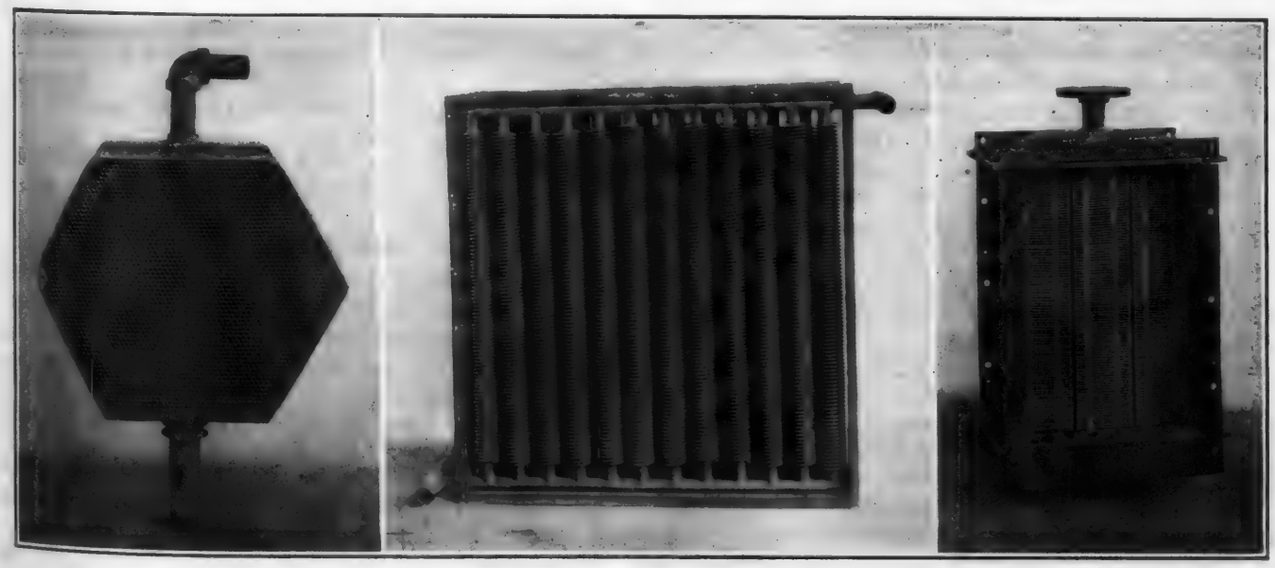
SYMBOLS

h = Air resistance loss through heater in inches of water.

V = Air velocity through the *free area* of the heater in ft. per min. (corrected to 70° F. and 29.92 in. Hg).

A = Free area of heater in sq. ft.

S = Surface of heater in sq. ft.



Types of Indirect Heaters Tested

$Q = VA$ = Air quantity in cu. ft. per min. (corrected to 70° F. and 29.92 in. Hg).
Cp = Specific heat of air at constant pressure. = 0.241 B.T.U. per lb.
D = Density of air at 70° F. and 29.92 in. Hg. = 0.075 lb. per cu. ft.
t_1 = Entering temperature of air in deg. F.
t_2 = Leaving temperature of air in deg. F.
t_s = Temperature of steam in deg. F.
t_f = Mean film temperature of air in deg. F.
θ_1 = Initial temperature difference between steam and air. θ_2 = Final, etc.
M.E.D. = Mean effective temperature difference between air and steam (deg. F.).
K = Coefficient of heat transmission in B.T.U. per sq. ft. per deg. *M.E.D.* per hour.
$h \times \frac{M.E.D.}{t_2 - t_1}$ = Resistance loss in inches of water per deg. F. temperature rise for 1 deg. *M.E.D.*

BASIC EQUATIONS

$$M.E.D. = \frac{t_s - t_1}{\log_e \frac{\theta_1}{\theta_2}} \qquad (1)$$

$$K = \frac{60Q \times D \times C_p \times (t_2 - t_1)}{S \times M.E.D} = \frac{1.085Q \times (t_2 - t_1)}{S \times M.E.D.} \qquad (2)$$

$$= \frac{1.085Q \times \log_e \frac{\theta_1}{\theta_2}}{S} \qquad (3)$$

$$t_f = t_s - \frac{M.E.D.}{2} \qquad (4)$$

$$\frac{V_1}{V_2} = \frac{T_1}{T_2} \qquad (5)$$

$$\frac{h_1}{h_2} = \frac{T_1}{T_2} \text{ Approx.} \qquad (6)$$

The basic problem in making a comparison of indirect heating surface is to fix the results obtained from each type so that they will coincide and then compare the amount of surface necessary for each heater to produce the same results. This means that Q, h, t_1, t_2 and t_s, are fixed equal to Q', h', t'_1, t'_2 and t'_s, respectively, and the comparison will be given by the ratio of $\frac{S}{S'}$ for any power input.

Under these conditions (from equation 1) $(M.E.D.) = (M.E.D.)'$ and from (2) $KS = \frac{1.085Q \times (t_2 - t_1)}{(M.E.D.)} = \frac{1.085Q' \ (t'_2 - t'_1)}{(M.E.D.)'} = K'S'$

or $K.S. = K'S'$

that is $\frac{S}{S'} = \frac{K'}{K}$

From which it is seen that $\frac{K'}{K}$ can be used to make the comparison of the heaters with as much validity as $\frac{S}{S'}$.

Now it can be easily shown that for any given type of heater at a given air velocity, h, $\frac{(t_2 - t_1)}{M.E.D.}$ and $\frac{S}{A}$ vary with the depth of heater. Thus $h \times \frac{(M.E.D.)}{(t_2 - t_1)}$ and $\frac{hA}{S}$ are both functions of velocity and type of heater. Since $Q = VA$ it is possible by altering A to obtain any air quantity desired for a fixed velocity without affecting the value of $h \times \frac{M.E.D.}{(t_2 - t_1)}$ or $\frac{hA}{S}$ so long as the depth of heater remains unchanged. Now the expression is in terms of the velocity and type of heater which embodies all the factors it has been desirable to fix. But K is also a function of velocity and type of heater. Thus if K is plotted against $h \times \frac{M.E.D.}{(t_2 - t_1)}$ for the different heaters the ratio of their $K's$ for the same $h \times \frac{M.E.D.}{(t_2 - t_1)}$ gives the desired heater comparison.

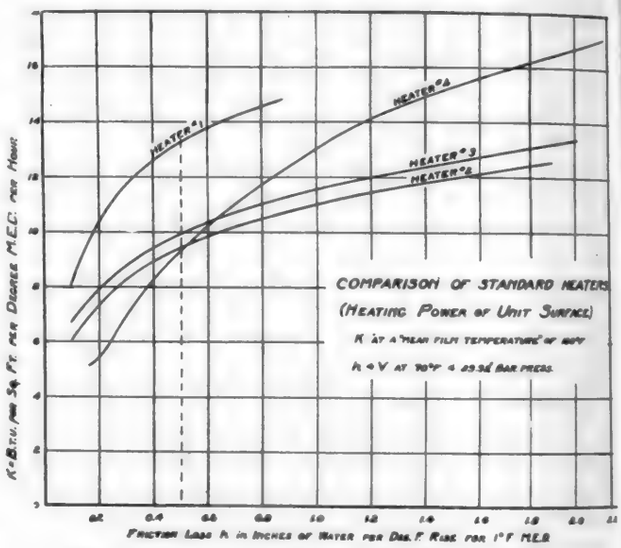


Fig. 1. Comparative Curves for Standard Heaters.
1—Aerofin, 2—Pipe Coil, 3—Vento, 4—Cartridge

In showing that $KS = K'S'$ an expression has been used which involved Q, t_1, t_2, and t_s. It is apparent that it does not matter whether these terms are individually equal for the two heaters so long as the resulting expression is equal. In order that $\frac{Q(t_2 - t_1)}{M.E.D.} = \frac{Q'(t'_2 - t'_1)}{(M.E.D.)'}$, however, it is necessary that $h = h'$. But it has just been shown that Q can be given any value without affecting either K or $\frac{h \times M.E.D.}{(t_2 - t_1)}$ so long as the velocity is un-

changed. If Q is reduced to unity for all cases, knowing that $hQ = h'Q'$ then $h = h'$.

The heaters can now be compared for any conditions of size, shape and velocity. It is found, however, that K varies with the film *temperature* and as this variation will depend on the heater used it is best to compare and test heaters at a fixed *film temperature* near the mean of actual operating conditions. Velocity and pressure loss must also be corrected to some fixed temperature which was here chosen as 70 deg. F.

METHOD OF COMPARISON ON COST, VOLUME AND WEIGHT

The heaters can be compared on the basis of cost, volume or weight by dividing K by the cost, volume or weight per cubic foot and plotting the resultant values which will give comparative curves. In each case the best heater from the standpoint of the comparison being made is the one whose curve is highest and the heaters compare proportionately to

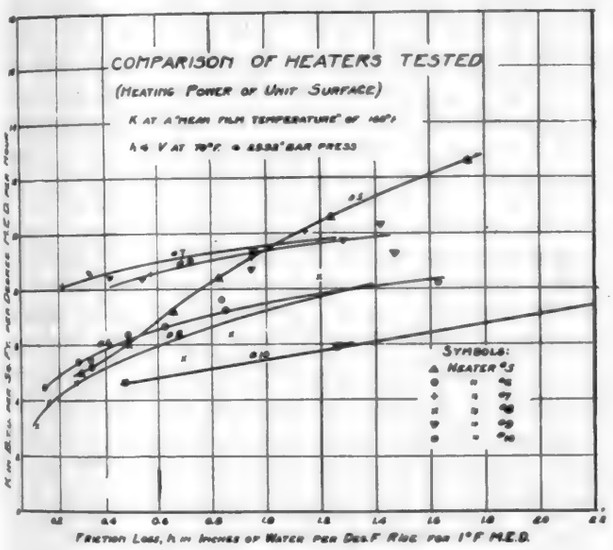

COMPARISON OF HEATERS TESTED
(HEATING POWER OF UNIT SURFACE)
SYMBOLS:
HEATER Nº 5
FRICTION LOSS, h IN INCHES OF WATER PER DEG. F. RISE FOR 1° F M.E.D.

Fig. 2. Results of Tests on Six Heaters

their heights at any value of $\frac{h \times M.E.D.}{t_2 - t_1}$. These curves can also be used as a basis of heater proportioning and design.

SAMPLE COMPARISON

Take on Fig. 1 a value of $\frac{h \times M.E.D.}{t_2 - t_1} = 0.5$ which corresponds with the center of working range of heater No. 1. Then on a comparative surface basis, in terms of heater No. 1, heater No. 2 is 71 per cent as effective, heater No. 3, 75 per cent and heater No. 4, 70 per cent; that is, with equal temperature rise and equal friction, heater No. 2 will require 41 per cent more surface than heater No. 1, heater No. 3, 33-1/3 per cent and heater No. 4, 43 per cent, or stating it in another way heater No. 1 could cost 141 per cent per sq. ft. of the cost of heater No. 2 per sq. ft. and still the resultant heaters would have the same annual charges.

Fig. 1 shows comparative curves of standard heaters, based on data obtained from tables published by the manufacturers of the several distinct types of heaters now being regularly used. These four heaters embody examples of the three types of heating surfaces referred to earlier, that is:

Heater No. 1—Gilled tubes, heat transfer by impact and parallel flow.

Heater No. 2—Pipe coil heater, transfer from impact.

Heater No. 3—Cast-iron heater, transfer from impact.

Heater No. 4—Simple tube heater, transfer, parallel flow.

Fig. 2 gives the results from tests on heaters Nos. 5, 6, 7, 8, 9 and 10.

These tests covered heaters of widely varying characteristics. This curve sheet shows the use of this method of comparison as applied to heating surfaces for which no published data are available, necessitating tests in the laboratory.

Curves drawn to show the effect of temperature on K, for a given radiator, show that at low velocities the variation is very small but at the higher velocities it becomes of such a magnitude as to make necessary the use for comparison purposes of a constant *film temperature*. This has been done in the present comparison t_2 being taken 160 deg. F. approx.

SUMMARY

First. The ratio between K in B.T.U. per sq. ft. per degree per hr. and friction in inches of water per deg. rise for 1 deg. F. *M.E.D.* has been proven to be a proper basis of comparison between heating surfaces.

Second. Examples of the use of this system of comparison between heating surfaces has been shown both for heaters where complete data are available and also for heaters for which there are only a few tests.

Summer Sales on Time Payment Plan

With the coming of the summer slump in the heating industry, many manufacturers are making specific drives, through their direct agencies, or through retail channels, to induce the summer purchase of heating plants on time-payment plans. Any legitimate plan that will stimulate business during periods of annual depression is worth while. When applied to such an item as a heating plant, to be installed in the owners' home, the risk would assume small proportions. Leading manufacturers have worked out their individual plans for time payments, and many have broadcasted them through national advertising.

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MEMBER
National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
National Trade Extension Bureau

VOL. 22 July, 1925 No. 7

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY
A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN . . Treasurer and Business Manager
P. E. FANSLER, ... Associate Editor
A. M. DANIELS, ... Contributing Editor

Executive and Editorial Offices . . 1123 Broadway, New York

Western Office . . . . . 105 So. Dearborn St., Chicago
CLIFF W. PRESDEE, Manager

European Representative
W. G. Hollinworth, 38, Victoria St., London, S.W.

Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	25 cents each

A GREAT light seems to be breaking over the face of affairs in the heating industry. It looks as if we were going to have a house-cleaning on a national scale. For years, in fact, since the earliest days of the industry, certain well-defined abuses have been tolerated until they came to be regarded as part and parcel of the industry. Price-cutting on the part of manufacturers was more than matched by knifing of competitors on the part of the contractors, to say nothing of commission-cutting on the part of the engineers.

Recently some of the more glaring of these abuses have become acute. It looks now as if this state of affairs might prove a blessing in disguise for it has at last aroused the responsible elements in the industry to adopt drastic measures to combat the abuses by striking first at the root of the trouble and then providing for a course of action calculated to maintain the industry on a higher plane. As far as the designing and contracting ends are concerned the situation has been expressed in plain language in the statement that in too many of our modern buildings, including apartment houses, offices, factories, theatres and other places of assemblage and hospitals, the heating and ventilating, hot water supply and other similar equipment, are sadly deficient, principally on account of their not being properly planned, specified and installed.

How deeply the various elements of the building industry are responsible is indicated by a summary of the causes for this condition, as expressed in a report presented at the Atlantic City meeting of the A.S.H. & V.E. In the first place, it is stated, too many owners and architects relegate the matter of heating and ventilation to an inferior position. Too many school boards, hospital committees and other bodies, use engineering as a foot ball to play graft, personal whims, personal favoritism or personal aggrandizement. Too many architects attempt to install heating and ventilation without proper knowledge of facilities. Too many engineers attempt to take work so cheaply that they cannot afford to do it right, or take more work than their organization can handle. Too many manufacturers and contractors attempt to furnish free engineering to architects and owners without the time and facilities to do it right. Too many general contractors attempt to squeeze a greater profit out of the job by cheapening the engineering equipment at the expense of the building. Too many loan companies try to cheapen the engineering equipment after flooding securities on the basis of higher class equipment. Too many architects make the employment of their engineers too much of a buying and trading proposition, putting off and dragging on to wear the engineer down in price until the job has progressed so far that the engineer cannot get proper space for his apparatus and has to hurry his study and design too much.

AS the first step towards eliminating these conditions it is proposed to organize all of the interests concerned, including architects, owners, loan interests, labor interests, managers and builders into a "Heating and Ventilating Equipment Board." Under this board it is proposed to organize a "Board of Engineering Equipment," to be supported by fees charged for services rendered or to be assessed from member organizations on a percentage of their business with a view of making the entire undertaking self-supporting.

Possibly the meat of the whole plan, from the standpoint of the heating and ventilating engineer, is a proposed "Engineering Bureau" to operate under the "Board of Engineering Equipment" and whose certification will be required and honored by all the interests represented, very much along the lines of the National Board of Fire Underwriters. Finally, it is proposed to go into the testing and approving of various kinds of apparatus and appliances through the co-operation of the American Society of Heating and Ventilating Engineers' Research Laboratory.

It will readily be seen that the plan proposes to take advantage of the "certified heating" movement and make use of it to the fullest extent to secure high-grade installations, at the same time securing a corresponding advantage for the public which has had to put up too long with insufficient design and slip-shod workmanship.

American Society of Heating and Ventilating Engineers

Heating Engineers Release Code on Heating and Ventilation

Publication of Code and Movement for Better Plans and Specifications High Spots at Society's Summer Meeting

AFTER four years of compilation and discussion, the American Society of Heating and Ventilating Engineers has released for publication its code of minimum requirements. This action was easily the most important of those taken at its Summer meeting in Atlantic City, June 15-17. The code will be known as "The A.S.H. & V.E. Compendium of Modern Practice." Care was taken not to adopt the code officially, and, in the minds of many, such official adoption may be postponed indefinitely. In this way, it is felt, the purpose of the society will be accomplished without entailing the responsibility that would go with formal adoption.

Of scarcely less importance was the movement started at the instance of Perry West, chairman of the Committee to Confer with Architects, to inaugurate a campaign for better plans and specifications in heating work. Mr. West offered a comprehensive program of procedure, involving the establishment of what may be known as a "Heating and Ventilating Equipment Board," to be composed of representatives of architects, owners, loan interest, labor interests, managers and builders, to function as a permanent body.

In connection with this board it is proposed to establish a Board of Engineering Equipment which is to direct an engineering bureau. If the plan is carried out as proposed, certification of all plans and specifications will be put into effect, very much along the lines of the practice of "certified heating," as adopted and used by heating contractors in various cities.

The 125 members, who, together with the large number of additional guests, attending the meeting, were rewarded by ideal Summer weather, in addition to the meeting program itself. As if to make conditions as nearly perfect as possible, old Neptune himself supplied the necessary heat units to bring the temperature of the ocean up to standard, 70° F., which he maintained throughout the meeting.

Opening Session, Monday Morning, June 15

President S. E. Dibble opened the meeting in the Rose Room of the Hotel Traymore, Monday morning. Due to the lateness of the hour the welcoming address was put over until the afternoon. Under committee reports, Perry West presented the report of the Guide Publication Committee.

Report of Guide Publication Committee

For the Guide Publication Committee, Chairman Perry West told of the intention of the committee to guard against any recessions from the present high standards of the Guide. It will be the endeavor, he said, to put the Guide data into such accessible and readily usable form that they may be more easily and generally used by the busy engineer, architect, contractor or mechanic. One of the thoughts in connection with this objective is to promote a wider and more general use of the scientific data accumulated by the Research Laboratory by putting such data into proper form for practical and every-day use.

It is planned to increase the circulation of the Guide and to issue it biannually instead of annually, at the same time increasing the advertising rates. This year, however, it is felt that there is enough room for immediate improvement in a new issue of the Guide and enough practical data on hand to justify its publication during the present year.

It is proposed to change the title of the "Technical Data Section" to "Technical Design and Specification Data Section" and to revise the text matter accordingly. Other important revisions will be made in the new edition. The preface will have sections on the selection of apparatus for specific purposes, the taking care of heating-up periods and the condition surrounding intermittent heating, the proportioning of boilers

Convention Photograph, American Society of Heating and Ventilating Engineers

and apparatus to the maximum and minimum load of requirements, and the length of the heating period.

The pipe size tables are being revised. Heat loss factors covering all of the existing combinations of building construction are to be included and a number of new combinations added, and factors given for still air conditions for a wind velocity of 15 miles per hour and a wind velocity of 30 miles per hour. In the matter of heat emission from radiators these tables are to be simplified and factors added for end and intermediate sections for different radiator heights and widths. The chapter on automatic heat control will be entirely revised to include the newer developments and remote controls, electric pneumatic controls and dual systems of controls.

Other revisions will include that of the chapter on heating boilers "to give some idea of the proper selection, kind and type of boiler for any surface, together with the requirements for their proper installation and operation." Data on systems and piping for water heating will be entirely revised, as will also be the chapters on air cooling and refrigeration, exhaust and cooling systems, design and construction of air ducts, air conditioning, air washers and filters, systems of ventilation and insulation.

Indications are that the new Guide will show an increase on advertising pages for last year when the total number was 200. The prospective income was given as follows: From advertising, $22,000; from sales, $3,000, or a total of $25,000. The estimated cost is: For printing and distribution, $12,000; overhead, $8,000; total, $20,000. This would leave a net profit of $5,000.

This was immediately followed by the report of the Committee to Confer with Architects, also presented by Mr. West. The meeting quickly sensed the importance of Mr. West's proposals and the plan he outlined was listened to with close attention by all present.

A Movement for Better Plans and Specifications in Heating Work

AN important movement, with the object of securing closer co-operation between owners, architects, engineers, contractors, loan companies, managers, manufacturers and salesmen interested in the heating and ventilating equipment of buildings, was inaugurated in a report by Perry West of New York, chairman of the society's Committee to confer with Architects. Mr. West told of the meeting of the New York Chapter, March 23, when representatives of the leading professions and trade industries got together and participated in a very frank discussion of the subject. As was brought out at that meeting, the great majority of our buildings are so poorly planned and specified as regards their mechanical equipment that it is utterly impossible, in the first place, to secure a fair and intelligent estimate and, in the second place, to properly install the equipment after the contract is awarded.

Mr. West summarized the points brought out in the earlier meeting as follows:

"In a great many of our modern buildings, including apartment houses in which millions of families are housed, the offices and factories in which they work, the theatres and places of assemblage to which they go for their amusement and even the hospitals to which they are taken when sick, the heating and ventilating, hot water supply, etc., is sadly deficient, principally on account of its not being properly planned, specified and installed."

PRINCIPAL CAUSES OF THE DISEASE

The principal causes of present conditions, as brought out at that meeting, were summed up as follows:

A. The practice of too many owners and architects in relegating the matter of heating and ventilating to an inferior position where it does not receive the proper attention.

B. The practice of too many school boards, hospitals, committees, etc., in using the engineering as a foot ball to play graft, personal whims, personal favoritism or personal aggrandizement.

C. The practice of too many architects in attempting to handle the heating and ventilating without proper knowledge and facilities.

D. The practice of too many engineers in attempting to take work so cheaply that they cannot afford to do it right.

E. The practice of too many engineers in attempting heating and ventilating work when it is out of their particular line.

F. The practice of too many engineers in taking more work than their organization can properly attend to. Trying to turn out engineering services on a quantity production basis, which is most difficult to do properly.

G. The practice of too many manufacturers and contractors in attempting to furnish engineering free to architects and owners without the time and facilities for doing it right.

H. The practice of too many general contractors in attempting to squeeze a greater profit out of the job by cheapening the engineering equipment at the expense of the building.

I. The practice of too many loan companies in trying to cheapen the engineering equipment after floating securities on the basis of higher class equipment.

J. The practice of too many architects in making the employing of his engineer too much of a buying and trading proposition, putting off and dragging it along to wear the engineer down in price until the job has progressed so far that the engineer cannot get proper provisions for his apparatus and has to hurry his study and design too much. The engineer should be in at the inception.

PROPOSED METHOD OF PROCEDURE

As the result of the New York meeting a method of procedure was outlined which, Mr. West stated, was being used as the basis of his committee's work:

"A splendid spirit of co-operation was shown at this meeting. A committee was appointed and the following method of procedure was outlined:

"1. That conferences be arranged between committees of the engineers, contractors and manufacturers through which a definite plan of action may be developed and agreed to.

"2. That a survey sufficient to show data and statistics to support and sell our claims be made.

"3. That after the plans are sufficiently developed, they be submitted, in brief, to a proper representative of the architects, owners, loan interests, labor interests, managers and builders for the purpose of determining as to whether or not these various interests will subscribe to, support and abide by our plans.

"4. That a convention of all of these various interests be called for the purpose of securing their co-operation, participation and responsibility in the final drafting of plans.

"5. That a board be then formed of representative members of all of these various interests for directing the operation of the plans adopted. This is to be known as the Heating and Ventilating Equipment Board. The necessary funds up to this point to be raised by a voluntary underwriting from members of the engineers, contractors and manufacturers.

"6. The work then to be started and carried on by a bureau under the direction of one man directed by the board. The field to include New York metropolitan district, at the start, with the possibility of extension as time and experience warrant.

"The necessary funds to come from fees charged for services rendered or to be assessed from member organizations on a percentage basis of their business, so as not only to make the entire undertaking self supporting but to liquidate the original underwritings and build up a reasonable reserve.

"7. More specific details of the organization and its workings are as follows:

"A. To consist of a Board of Engin-

Testimonial Dinner to Dean Anderson

ONE of the most delightful features of the convention was a testimonial dinner to Dean F. Paul Anderson, in appreciation of his four years' service as director of the A.S.H. & V.E. Research Laboratory. This dinner was held at the Hotel Traymore on the opening night of the meeting and was attended by some 60 of Dean Anderson's warmest friends and admirers.

William H. Driscoll, chairman of the society's Committee on Research, was the toastmaster. At his right was the guest of honor, Dean Anderson. Others seated at the head table were: President Samuel E. Dibble, Charles F. Eveleth, Perry West, Willis H. Carrier, J. Irvine Lyle, Thornton Lewis, Charles V. Haynes, Dr. E. Vernon Hill and F. R. Still. In opening the festivities, Toastmaster Driscoll aroused the diners to a high degree of enthusiasm by displaying a check which he had just received from President W. T. Jones of the Massachusetts Chapter. This check was in the amount of $1,000 and was for the benefit of the Research Laboratory.

Mr. Driscoll apologized for his lack of preparation due to the fact that he had not been aware, until a short time before the dinner, of the fact that he was to assume the duties of toastmaster. He then proceeded to pay a tribute to what he considered the highest ideals of life in an address which was later characterized by Dean Anderson as one of the best expressions on the subject he had ever heard. Mr. Driscoll took as his keynote a motto he had recently seen which read, "Everything Passes, Art Alone Endures." He showed how truly this applied to all functions of life, and how it had been applied by Dean Anderson in the devotion he had shown to the development of the minds and characters of young men. Dean Anderson's achievements, he declared, are secure, for his work, both at the Research Laboratory and at the University of Kentucky, is of value to the whole world. These ideals, he said, will continue to be applied by Dean Anderson in his work at the University to which he will devote all his time as soon as the Committee on Research has succeeded in securing a new director of research.

President S. E. Dibble, who was next called upon, paid a warm tribute to Dean Anderson, drawing an analogy between the character of the Dean and the depth, breadth and energy of the ocean.

Dean Anderson

Thornton Lewis, who spoke as a former chairman of the Committee on Research, referred to his long acquaintance with Dean Anderson, extending over a period of nearly 25 years. Dating from his freshman days in the university, this acquaintance continued through the relation of friendly guide and counselor to the student and graduate, developing, after leaving college, into a friendship of man to man which, he stated, has ripened as the years passed. "There has never been a time," he declared, "that Dean Anderson's friendship has not meant an inspiration to love my fellowman more—to do better each day's work and to seek the worthwhile things of life." Mr. Lewis then told of the engagement of Dean Anderson four years ago as director of the Research Laboratory by the committee representing the society and composed of Messrs. Still, McColl and Lyle.

"These three wise men," stated Mr. Lewis, "thought they were getting a research director. How little did they, or we, understand, for instead of securing only a director of research, they secured a director of our ideals. This leader, who then came into our work has always directed our attention to the humanities of life. He was not a mere organizer, not a mere scientist, not a mere heating and ventilating engineer," declared Mr. Lewis, "but, being all these things, he was also something more—he was a spiritual leader.

"At all times he focused our attention on the ideals of service to our fellow-men. He never allowed our talents, or his, to be prostituted to only the material things of life, but constantly showed us the opportunity for service to humanity in general, and the happiness of personal relations in particular.

"Dean Anderson has shown the way, and has been a prophet of the new order and because of this our Laboratory has survived. If its work had been allowed to be only of a selfish character—one of pure commercialism—then it would not have lived and come out triumphant."

As he concluded, Mr. Lewis presented Dean Anderson with what he described as a material expression of the feelings of those present, in the form of a silver-mounted walking stick.

DEAN ANDERSON'S RESPONSE

When Dean Anderson arose to respond to the many laudatory remarks he admitted that his emotions made it more than difficult for him to speak. His connection with the Research Laboratory, he said, had been simply the establishment of another human relationship. He spoke of his long career as dean of the College of Engineering of the University of Kentucky—he has the longest record of any dean of Engineering in the country. This long experience, he said, has convinced him that the only worthwhile things in life are friendship and love. The heating engineers' society, he said, has been a beacon and a light of inspiration to him. The society, in its organization of the Research Laboratory, has established ideals which none of us can appreciate at the present time. "All of you," he declared, "have a right to be proud of the fact that you were associated with the work."

The laboratory, he added, has been properly established. It was founded to determine some of the physical laws rather than to learn which particular device was better than another. It is idealism, he declared, that makes us do the big things of life, and it is idealism that has guided the Research Laboratory in all of its undertakings.

He predicted a great future for the advancement of research in general and of the A.S.H. & V.E. Research Laboratory in particular, and declared his heart would always be in the work.

eering Equipment composed of a representing member from the owners, architects, engineers, contractors, labor interests, managers and loan companies; directing an engineering bureau whose certification would be required and honored by all interests represented, founded upon underwritings, but made self-supporting and refunding from fees, similar to the National Board of Fire Underwriters.

"B. The work of the board and its engineering bureau would be to encourage and promote the better planning, specifying and installing of heating and ventilating equipment.

"C. To assist all interests in their ways and means of securing better heating and ventilating equipment.

"D. To bring about the co-operation of all of the various interests to the point where all plans and specifications shall be passed upon and approved as to the sufficiency and clearness for proper estimating and installation before the contractor members will estimate or install or before the mechanics will go on the job.

"E. To further extend this as time and experience warrant, to the point where the methods and character of the apparatus shown and specified shall be approved by the bureau as to correctness and adequacy for the purposes intended.

"F. To go into the testing and approving of various kinds of apparatus and appliances through the American Society of Heating and Ventilating Engineers' Research Laboratory in a manner similar to the work of the National Board of Fire Underwriters' Laboratory.

"G. To promote the institution of better laws and ordinances governing the proper installation of heating and ventilating apparatus similar to the work of the National Board of Fire Underwriters along these lines.

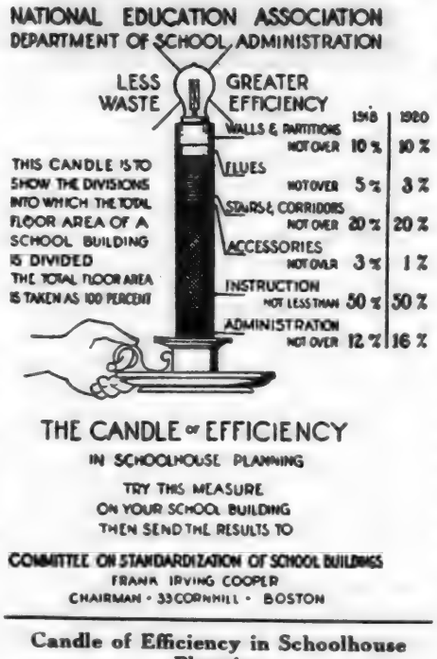
"H. To have the board either as a board or through the director or its bureau, act as the final medium of arbitration on all matters of dispute between the various interests and to promote the general welfare of the industry in its relations with others."

Mr. West reported that the Heating and Piping Contractors' New York City Association and Newark, N. J., Association have already appointed committees to confer with his committee on this undertaking, with a view of doing for the heating and ventilating industry what similar organizations have effectively done for other industries.

For the Membership Committee, Chairman Charles V. Haynes reported an increase of 85 members since the annual meeting, making the total membership 1,861. This, said Mr. Haynes, was a remarkable showing, especially in view of the fact that it followed the recent increase in the dues in the form of $25.00 per member, for the support of the society's Research Laboratory. Mr. Haynes's figures were received with enthusiasm, as was his prediction that the membership would shortly go over the 2,000 mark and would reach 3,000 during the present year.

Tests on Dry-Air Filters

President Dibble withdrew from the chair to present a paper, not on the program, describing tests made at the Carnegie Institute of Technology on the efficiency of dry air filters. During the delivery of his paper the chair was occupied by Vice-President F. Paul Anderson. Mr. Dibble stated at the outset that before going very far in testing dry air filters it would be necessary to compile a testing code for this type of apparatus. In the tests which he conducted dust was discharged and drawn through an air filter measuring 15 x 8 x 9 in., and thence through a pipe 20 in. square. The filter was washed after each test. The time element, it was found, was an important factor, as was also the power element as it was found that the resistance of the filter gradually increased. The air velocity also increased as the passages became stopped up, and the efficiency was correspondingly reduced.


NATIONAL EDUCATION ASSOCIATION
DEPARTMENT OF SCHOOL ADMINISTRATION
LESS WASTE
GREATER EFFICIENCY
1918
1920
WALLS & PARTITIONS NOT OVER 10 % 10 %
FLUES NOT OVER 5 % 3 %
STAIRS & CORRIDORS NOT OVER 20 % 20 %
ACCESSORIES NOT OVER 3 % 1 %
INSTRUCTION NOT LESS THAN 50 % 50 %
ADMINISTRATION NOT OVER 12 % 16 %
THIS CANDLE IS TO SHOW THE DIVISIONS INTO WHICH THE TOTAL FLOOR AREA OF A SCHOOL BUILDING IS DIVIDED THE TOTAL FLOOR AREA IS TAKEN AS 100 PERCENT
THE CANDLE OF EFFICIENCY
IN SCHOOLHOUSE PLANNING
TRY THIS MEASURE ON YOUR SCHOOL BUILDING THEN SEND THE RESULTS TO
COMMITTEE ON STANDARDIZATION OF SCHOOL BUILDINGS
FRANK IRVING COOPER
CHAIRMAN • 33 CORNHILL • BOSTON

Candle of Efficiency in Schoolhouse Planning

In the tests an efficiency of 78% was maintained. In measuring the dust removal Mr. Dibble made the comment that a 100% efficiency for one type of dust determinator would not apply necessarily to other dust determinators. Those used were the Hill dust counter, the Anderson-Armspach instrument and the Cottrell dust precipitator. The point to be determined in a test, said Mr. Dibble, is that at which dust fails to pass through. He suggested that the society proceed at once to develop a testing code for dry air filters.

In the discussion it was asked if the dust-measuring instruments used showed a steady efficiency. In reply Professor Dibble stated that the Anderson-Armspach instrument gave an even line, while the Cottrell apparatus was 100% efficient. One of the points brought out in the discussion was that in some air filters dust collects on the face of the filter, while in others it collects all the way through. In this connection the interesting point was brought out that the dust as it collects becomes impregnated with oil and furnishes an additional dust-removing surface. In that way, it was stated, the efficiency of the filter is maintained.

Dean Anderson told of recent tests which had been made of the effectiveness of the A-A dust determinator and announced that a further paper on this subject had been prepared by the Research Laboratory by Miss Margaret Ingels, and would appear in the Proceedings. He also stated that a patent on the A-A dust determinator had been obtained which was the property of the society. This action was taken as a means of protection in controlling any future commercial manufacture of the instrument.

MR. GORDON'S ADDRESS

The presence of Charles Gordon, a member of the Boiler Code Committee of the American Society of Mechanical Engineers, led to his being called on by President Dibble to address the meeting. Mr. Gordon made a plea for standardization and co-operation. He congratulated the society on its progress in this direction, especially through its Research Laboratory and declared that what is worth while is worth paying for. "You must fight your own battles," said Mr. Gordon, "for no one will fight them for you." He emphasized the importance of maintaining a legislation committee and said that publicity should be given to the fact that proper legislation does not cost the people more money, but actually costs them less. This, he said, was true of the A.S.M.E. Boiler Code, and would no doubt be true in practically all cases where correct standards are adopted.

Monday Afternoon Session, June 15

Coroner Harrison of Ocean County represented the mayor of Atlantic City in an address of welcome at the opening of the afternoon session. Mr. Harrison made a witty address, referring particularly to the activities of the dry navy, which, he said, might cast a damper over the pleasures of the meeting. However, he added, he would go as far as he could go by presenting the key to the city to the members and trusted they would not hesitate to call upon him in case of need, although he hoped not in his official capacity.

The first paper of the meeting was presented by Frank Irving Cooper of Boston on "Eliminating Waste in School House Planning."

Mr. Cooper's paper was a review of two studies made by the National Educational Association; one of 100 school buildings, and another of 80 school

buildings. Among the points brought out was a range in the space devoted to heating and ventilating equipment from 1½% to 15% of the building space. This, he said, showed an excessive variation indicating clearly divergent views as to the proper methods of ventilation. He presented a diagram which he termed the candle of efficiency in school-house planning and suggested that this measure be tried on a school building before completing the plans. As will be noted from this diagram, not less than 50% is assigned to instruction. The plans actually studied showed a variation of from 38% to 69%.

A paper was presented by Dr. W. J. McConnell, in addition to those scheduled on "Deciding Factors of Adequate Ventilation." Dr. McConnell reviewed the work of the Research Laboratory in connection with "effective temperatures" and announced that a bulletin was in preparation on the latest phase of this investigation.

Tuesday Morning Session, June 16

The subject of boiler ratings came up at the opening of the Tuesday morning session through the suggestion of Chairman J. F. McIntire that a short field test code be prepared based on the present A.S.H. & V.E. Test Code. After some discussion favorable action was taken on this proposal. A paper was presented by C. G. Buder on "Value of Fans in Furnace Heating." A synopsis of this paper appears on another page.

PROPOSED AMENDMENTS TO CONSTITUTION

At this point a number of proposed amendments to the constitution, offered by the Kansas City chapter, were presented, among other things, for duly elected delegates to the meetings, direct chapter representation in the election of council members and re-incorporation of the society to permit the holding of the annual meetings in other cities than New York. These proposed amendments will be submitted to the members and will be voted upon at the society's annual meeting in January.

A paper on "Proposed Method for Comparison and Effectiveness of Indirect Heating Surfaces," by A. E. Stacey, Jr. and J. M. Ashland, was presented by Mr. Stacey. This paper is presented practically in full on another page.

In the discussion Mr. Carrier offered, what he described as a handy rule in figuring indirect heating work. This rule was expressed as follows: five times the pressure increase = twice the heat transmission. The velocity loss, he said, is the significant item when a comparison is made of heaters of different design. Other papers presented at this session were: "Effect of Length of Leader Pipe on Heating Capacity in Gravity Warm-Air Heating," by Professor V. S. Day, University of Illinois, and "Allowance for Variations in Temperature at Register Faces for Design of Warm-Air Furnace Systems," by Professor A. P. Kratz, also of the University of Illinois.

Status of Research Laboratory

Knowledge that the remainder of the morning session would be devoted to a discussion of the Research Laboratory and its activities brought most of the delegates into the meeting room as Chairman Willian H. Driscoll of the Committee on Research took the chair. Mr. Driscoll said that life had been characterized as one problem after another, but life had nothing on the difficulties which have come before the Research Committee for solution. While Dean Anderson, the present director of the Research Laboratory, was willing to continue on a part-time basis, the committee and the membership of the society felt that the need was for a man who could give 100% of his time to the work. He announced that the position of director of research had been offered to Professor F. E. Giesecke of the University of Texas, who, however, had been obliged to decline the offer. As a result, the committee was unable to announce the appointment of a new director.

On this account, he stated, a detailed program of further tests was being held in abeyance as it was felt this program should be arranged by the new director. He could say, however, that the committee was planning to enlarge the test program on critical steam velocities through pipes and to conduct radiation tests to see if it will be possible to carry out the simplification program proposed by the heating contractor's association to abandon the manufacture of the steam-type radiator.

Referring to the need of a heating research residence Mr. Driscoll predicted that by the end of another year the society would have such a residence, and that it would be built from funds apart from those of the Research Laboratory.

No less than 1500 suggestions, he said, had been received by the committee for the conduct of the Laboratory, and each one of these has been placed on file where it will come up for action. In the future work of the Laboratory, he said, it is proposed to have a Technical Committee on each problem under investigation to take general charge of the tests. He then called upon Dean Anderson, reading, as an introduction, a letter from Dr. Alice G. Bryant in appreciation of Dean Anderson's work.

Dean Anderson's Address

Dean Anderson was warmly welcomed. We are too close to the Research Laboratory, he said, to estimate its importance or the value of its work. He referred to the wonderful co-operation which had been rendered by the Government in the research work and characterized it as something unique in the history of engineering associations. Dean Anderson told of a motto he had seen on the estate of the well-known turfman John E. Madden, which reads, "No Complaints Considered Unless Accompanied by a Remedy" and he offered this as a principle for the guidance of the Research Laboratory.

As an evidence of the character of men who had been doing the research work, he spoke of the way they were being drawn away from the laboratory, one the latest of these being Dr. W. J. McConnell who had accepted an appointment as Supervisor of Public Health in Philadelphia.

"We are all familiar," said Dean Anderson, "with the three estates of men, clergy, lords and commons, and the fourth estate, of the press. There has now been suggested a fifth estate which has been characterized as "that coterie of men who have the simplicity to wonder, the ability to analyze, the power to generalize and the capacity to apply."

One of the great deeds of the day, he said, is the preparation of technical literature so that the average man can understand it. While the activities of the Research Laboratory have been somewhat curtailed due to the uncertainty as to its organization, he felt that some very important work nevertheless was being accomplished in the researches now going on. The fourth paper, he said, on effective temperatures, had been completed, thus covering all of the phases of this investigation which had been undertaken. He also referred to the paper by Miss Margaret Ingels on dust, which, he said, represented a comprehensive and valuable study of the subject.

Wednesday Morning Session, June 17

A proposed amendment to the society's by-laws providing for three-year terms for members of the council, instead of one-year terms, was submitted by the Illinois chapter, and will take the regular course of being voted upon at the annual meeting.

Publication Authorized of Heating and Ventilation Code

President Dibble then opened the discussion upon the proposed report of the Committee on Minimum Requirements for the Heating and Ventilation of Buildings, of which L. A. Harding is general chairman. At his suggestion the discussion was limited to the report as a whole, rather than to the various sections. J. A. Donnelly offered a resolution that the code be adopted, subject to changes by the committee. E. C. Evans offered an amendment that the code be sent to the members and voted upon at the annual meeting.

Thornton Lewis made a counter suggestion based upon a discussion of the

subject at the previous night's meeting of the council to the effect that the code be published and offered for sale as a "Compendium of Practice." Another suggestion was that this be called a "Compendium of Modern Practice on Heating and Ventilation" and that the publication be placed in the hands of a committee to be appointed by the president.

It was finally voted to publish the code under the title of "The A.S.H. & V.E. Compendium of Modern Practice" and to add a foot-note to the title page reading: "It is intended that this report be used as a basis for a code."

When the final vote was taken the applause was deafening and marked a genuine climax to the three day's sessions.

With this action the meeting came to a close.

Elaborate Entertainment Program Carried Out

An attendance of some 50 ladies provided the background for an elaborate entertainment program which continued throughout the three days of the meeting. In charge of the arrangements was an executive committee headed by C. V. Haynes, chairman; R. C. Bolsinger, sub-chairman; W. J. Olvany, sub-chairman, and Messrs. H. P. Gant, E. T. Murphy, A. A. Adler, R. H. Carpenter and Secretary F. C. Houghten. On the finance committee were: G. A. Dornheim, chairman, and F. E. W. Beebe, P. J. Watters, R. Donnelly and A. J. Nesbitt, while the entertainment committee was made up of G. G. Schmidt, chairman, Alfred Engle, Arthur Ritter, J. A. Donnelly and Perry West. Due to a change in the program, Monday afternoon was left free for enjoyment and many took advantage of the warm surf to go in bathing, the water being reported at 70° F.

A party of some 30 members of the society was taken to the plant of John J. Nesbitt, Inc., in Atlantic City, Monday afternoon where an inspection was made of the process of manufacture of Universal unit ventilators. A. J. Nesbitt of the company acted as host in conveying a party in buses from the hotel to the plant and in showing the visitors the interesting features of the manufacturing process.

On the opening night of the meeting, following the testimonial dinner to Dean Anderson, the members and guests met for an informal reception and dance in the Rose Room at the Hotel Traymore. Tuesday the ladies were taken by automobile to the Country Club of Atlantic City where luncheon was served, followed by a bridge party. In the meantime the men played golf.

All of the party returned in time to take part in the festivities at Steeplechase Pier the same evening. Carnival suits were in order and the party gave itself up to an evening of hilarity and fun-making on the many sensation-producing novelties of the pier, running from hair-raising slides to Ferris wheels, merry-go-rounds and similar devices. Wednesday afternoon was devoted to rolling-chair rides and swimming parties.

Heating Industry Must Act as a Unit

FURTHER evidence of the urgent need on the part of the heating industry for some method or agency for presenting and keeping before the public the distinct character of the service it renders is brought out by Louis T. Braun, secretary of the Chicago Heating and Piping Contractors' Association in a letter appearing in the national association's *Official Bulletin*. Similar views were expressed editorially in THE HEATING AND VENTILATING MAGAZINE for November, 1924, in the statement that "the question arises as to whether the heating industry itself is not to blame for the failure to keep before the public its character as essentially a distinct industry. As was brought out only recently, the fact that a heating man takes a plumbing contract or a plumber takes a heating contract does not in itself make him a combination heating and plumbing contractor, any more than a man who plays tennis and golf becomes a combination tennis and golf player. But if the heating industry is not going to bestir itself in making this fact clear to the public, it will have no one but itself to blame if the present popular misconception of the two industries continues to prevail.

"As the case stands at present, the warm-air furnace men have their Publicity Bureau to advance the interests of warm-air furnace heating, the plumbing and heating contractors have their Trade Extension Bureau, but the heating and ventilating engineers and contractors are still without adequate means for presenting and keeping before the public the distinct character of the services they render."

"There is no better time than now," declares Mr. Braun, "to take up the question of co-operative effort between the manufacturer, the heating contractor, and the journeyman steamfitter for a campaign of advertising to acquaint the public with the advantage of heat by radiator.

"The indications are that the peak of the building boom has been passed and that there will be a gradual reduction in the volume of our business. Therefore, there should at once be a carefully-planned campaign to increase the sale of our product and regain the business lost because of our tardiness in collective effort.

"We should establish a laboratory in conjunction with the laboratory of the American Society of Heating and Ventilating Engineers to work on the everyday problems of installations. When I say everyday problems of installation I don't mean to devote time to the higher technical problems, but I do mean to give thought to perfecting our apparatus increasing efficiency and, in general, making possible better heating installations.

"Also we should have an advertising bureau maintained by the heating industry to tell the people why radiator heat is the best and most economical heat in the world."

Flues Are Essential From Kitchens Where Gas is Burned

The growing tendency to cheapen building construction as much as possible by the omission of all but necessary elements is evidenced by the filing of many plans showing kitchens, laundries, and such working rooms, without flues, on the assumption that, gas being used for fuel, no outlets are required.

As a number of fires have been recently reported, due to lack of such flues, it becomes evident that the attention of architects, engineers and owners should be drawn to the possibility of fatalities resulting from such mistaken ideas of economy.

Good ventilation should always be provided where gas is burned as, in winter, when windows are kept closed, it does not take long to reduce the oxygen content to the point where there is insufficient for both complete combustion and human consumption. Flues should lead from each kitchen where gas is burned, preferable with a hood over the range. With the low initial cost of miniature blowers and exhaust fans, and the small quantity of electricity consumed, such an addition to a kitchen hood will result in a highly-efficient safety device, as well as in a much more agreeable working room.

The same argument applies to the condition resulting from the increasing use of automatic gas water heaters. Many of these are installed in laundries without flues. An appreciation of these considerations by the ventilating engineers and those interested in framing proper building codes would undoubtedly materially reduce fire risks in future construction and produce more livable homes.

Low-Pressure Boilers and Vacuum Heating System

In an article appearing in THE HEATING AND VENTILATING MAGAZINE for May, 1925, entitled, "Dangers to Low-Pressure Boilers Used in Vacuum Heating Systems," the name of the author was inadvertently omitted. This article was written by William W. Gaylord, of New Haven, Conn., and our readers may look forward with interest to further contributions from Mr. Gaylord on heating subjects.

Heating and Piping Contractors' National Association

Heating Contractors Adopt Standards for Radiator Valves and Screwed Fittings

Early Solution of Boiler Rating Problem Also Reported at Association's Annual Convention

BETWEEN the adoption of new standard sizes of radiator supply valves and malleable iron and cast-iron fittings, and such progress in the matter of boiler ratings as to bring within sight the solution of this vexing problem, the thirty-sixth annual convention of the Heating and Piping Contractors National Association left a record of splendid achievement. The association met this year in Detroit, Mich., June 1-3, with headquarters at the Book-Cadillac Hotel.

To Walter L. Fleisher, of New York, chairman of the Standardization Committee and to former Vice-President George W. Getschow, chairman of the Boiler Rating Committee, went a large part of the glory for the past year's accomplishments and the reports of these two committees held the limelight at the convention. In the matter of the standard sizes proposed for radiator supply valves and malleable-iron and cast-iron screwed fittings, these were adopted unanimously by the convention. In the matter of boiler ratings there was no mistaking the enthusiasm with which the members present greeted Mr. Getschow's statement that "we are nearer than ever before to a solution of ratings for house-heating boilers."

From many sections of the country came reports of the successful operation of the "certified heating" plan and the report of the Standardization Committee showed how closely the establishment of good practice in heating work linked up with this plan in furnishing a basis for more accurate designs.

More than one speaker discussed the dangerous condition existing in the trade due to the lack of apprentices or of steamfitters' helpers, but the convention took no action on this matter.

Over 600 members and guests were registered at the convention. Sessions were held in the ballroom of the Book-Cadillac Hotel.

The meeting of the board of directors Monday morning, followed by a dinner in the evening of the Old Guard, comprised of the past-presidents of the association, prepared the way for the convention itself.

Tuesday morning was given over to registration and meetings of State groups and secretaries of local associations.

Tuesday Afternoon, June 2

Practically every chair in the convention hall was filled when President Frank A. Merrill called the convention to order Tuesday afternoon. After singing "America" President Merrill introduced Corporation Counsel John Atkinson who welcomed the delegates.

President Merrill then delivered his annual address. He said, in part:

Heating Contractors in Convention in Detroit

PRESIDENT'S ADDRESS

We owe much to our predecessors who have built up this organization for with keen precision they observed the futility of disorganized and unintelligent competition.

We should not attempt to analyze too closely all the motives which actuated the founding of this association. They might be subject to some criticism when viewed in the light of thirty-five years of experience and development.

Be that as it may, our predecessors recognized that an unethical or unfair competition born of ignorance was disastrous and interfered with their welfare so after surveying the field carefully they came to the only conclusion that men who have brains and ability could come to, namely, that their only salvation lay in the co-operation which association with others would bring.

And so through thirty-five years we have been formulating rules of the game and developing team work much as the athletic associations have done. I wonder if we have always shown that class of sportsmanship and co-operation which was inculcated in our youth.

With all due respect to those who have worked so hard way back there in those first trying years, I wouldn't wonder if some narrow, selfish and somewhat fanciful ideas had to be thrown into the discard. But notwithstanding all the vicissitudes which confronted this association and the problems of adopting this and rejecting that, they were guided by the star of co-operation and organization.

IMPORTANCE OF FREE AND OPEN COMPETITION

The public demands free and open competition in all lines of trade particularly in the merchandising of commodities. Collusion and illicit bargaining generally result in stifling the kind of competition our Government demands.

But while the Government demands free and open competition, it likewise demands *intelligent* competition and looks with disfavor upon practices which cause loss and disaster not only to those who indulge in them but to those who are victims of such practice and to those competitors who are denied the privilege of performing the work satisfactorily.

Our association will always stand as it has in the past for supporting and defending the will of the people as indicated by the laws they pass in accordance with our constitution, but we have an equal responsibility to see that we employ all the legitimate ways and means to make that free and open competition intelligent and dependable.

One of the greatest difficulties in educating the members of our craft is to get them away from the dangerous and narrow belief that they are simply trading in a commodity. Our Supreme Court has informed us that labor is not a commodity and surely the technical knowledge and experience necessary for properly installing the various parts we handle is not a commodity.

Simply guessing at the amount of material and labor necessary to do a given piece of work and charging nothing for the service rendered, nothing for the ability and skill with which material is supposed to be installed, is fraught with grave danger to both the seller and the consumer.

Thus it is our duty not only to observe the law but to continue to correct this dangerous practice for the public good as well as our own.

CRAFT MUST BE ON GUARD AGAINST ENCROACHMENTS ON ITS FIELD

If we claim that our craft is being invaded by incompetent or illegitimate operators we must jump in and do this work ourselves and not be a dog in the manger. The supply must be kept up to the demand.

If others create the demand, as they are doing to-day, it is our duty to make the installations which supply that demand.

I recently read an article in a certain trade paper, which has a wide circulation, setting forth the reasons why the plumber is the logical man to sell and install the oil-burner tank. I need not go into the fallacy of this claim, but assuming this service we can expect unless we combat these conditions by these encroachments to multiply rather than diminish.

MUST SELL OUR SERVICE TO THE PUBLIC

We have for many years been doing excellent work in lifting up our contractors from a master fitter's station to that of a full fledged business man.

Hundreds of operators who used to have the plain word "Steamfitters" painted across their window are now taking their places in their community as "Heating Contractors and Engineers."

Heretofore our energy has been spent on selling our association to them and raising them up to the standard of the well informed, broad-gauged business men. That is a very praiseworthy performance.

We have now reached the stage in our progress when we must sell our service to the public. That means we must present an entirely different front than we have been doing.

Remember that the foundation of business is confidence. Confidence of the public in the service you render.

How then can we gain the confidence of the public quicker and to a greater extent than by advertising the service we render, and the fact that that service is backed up by an association of which we are a part.

SHOULD PLAN PUBLICITY CAMPAIGN

We must tell architects, engineers and consumers the country over what we are attempting to do for them, and make our membership in this association a reasonable assurance to the public that we possess the highest integrity and efficiency in our craft.

Most of the advertising up to date that has resulted in converting the public to the idea of radiator heating has been left to the manufacturers of various products. We must now co-operate with that selling force and tell the public through our locals why they require *our* services, why radiator heat is the cheapest and most efficient in the end, how we propose to serve them and what our basic principles of operation are.

I am quite sure that the manufacturers will welcome the day when we take our light from under the bushel.

We have waited for business to come to us altogether too long. If we now go out and create business by telling our story direct to the consumer, if we can, as the saying is, "make two blades of grass grow where formerly one grew," will we not to a great extent relieve the excessive competition which now prevails in many localities?

If we would preserve an unrestricted competition as the law requires, we must create a demand for our services equal to the supply.

Asking the Public to Buy Radiator Heat is only half the story; it is for us to point out the service we render and the dangers of good material being improperly installed.

I recommend that careful consideration be given this suggestion and that renewed energy be given to the adoption of an insignia and slogan, as a part of this publicity campaign.

No presidential address would be complete at this time without a public recognition of the debt of gratitude we owe to our Chicago local for their untiring efforts to make this association a powerful and constructive organization.

In many ways they have inaugurated measures within their own local sphere only to turn them over at the proper time to our National association that all might enjoy the advantages resulting therefrom. They have sold the association idea to dozens of new members during the past year all of whom have been added to our National membership.

They have developed and advertised new methods of procedure notably among which is that of "Certified Heating" and after establishing the same have at considerable time and expense imparted this valuable information to others for their enjoyment and material benefit.

But their crowning achievement has been in inaugurating the movement toward stable boiler ratings. After spending an enormous amount of time and at much expense in preparing and printing their method, they have with a rare generosity turned it all over to the commit-

tees of this association for their guidance.

Our beloved and honored ex-president, George M. Getschow consented to be the chairman of the committee when he might well have rested after two strenuous years in the presidential chair.

But as though that was not enough, at their own expense they have sent Harry M. Hart and Charles G. Lamb to every meeting of the committee that we might have the advantage of their skill and expert knowledge relative to this matter.

I suggest that we here and now extend a rising vote of thinks to the Chicago local association and these three gentlemen for their services and sacrifice in our behalf.

President Merrill's address was warmly received. He then presented Professor Thomas H. Reed who spoke on "Politics and Business."

Professor Reed stated that no business exists to-day that is not related to some extent to the government, yet the country has not yet introduced business into politics. He said that to-day government activities are constantly encroaching upon business and that the only escape from government interference with individual activity is more business in government. The hope of the community, said Professor Reed, rests in the hands of business men and he urged the establishment of what he felt the country needed most, a business government.

CONVENTION COMMITTEES

The following convention committee appointments were announced by the chair: Auditing, J. T. Dyas, chairman; Association Improvement, Publicity and Relationship, F. W. Howard, chairman; Credential, F. H. Meadows, chairman; Nominating, G. M. Getschow, chairman, the other members of this committee being H. G. Black, W. D. Emery, J. T. Bradley and G. H. Drake.

SPRING LABOR SURVEY

Copies of the association's Spring Labor Survey, showing wages and conditions in the steamfitting trade in 154 cities in the United States, effective May 1, 1925, were distributed and the figures were explained by Secretary Gombers.

Of the 154 cities reporting, there were only four where wages paid to journeymen steamfitters are as much as $12.00 a day of 8 hours, and as two of these cities are close to each other, it might well be said that in only three communities the steamfitter's wage is $12.00 a day. These three communities are in the middle west.

In fourteen cities the journemen's wage is $11.00 a day and, in five cities, $10.50 a day, making only twenty-two cities where wages are over $10.00 a day. There are thirty-two cities where $10.00 a day is the wage, while the balance of seventy-four cities, or exactly one-half the cities reporting, wages are less than $10.00 a day. The lowest wage is 75c an hour, or $6.00 a day, that being the rate in several New England cities.

In eighty-nine cities appearing in the report of November, 1924, and May 1, 1925, nine show increase in the journeyman's wage. Two show a decrease in the journeyman's wage. Eleven show an increase in the helper's wage, while eight show a decrease in the helper's wage, and seven on the present, or May, 1925 list, did not report wage for helpers where they did report on the 1924 list.

On the present list nine show an increased wage paid to laborers. Nine show a decrease in wages paid to laborers. One shows a decrease in hours per week, where two show an increase in hours per week. Among the reasons for reporting the wages paid to laborers and other data pertaining to them is that a comparison may be made between wages paid to steamfitters' helpers and laborers, and also that it is a barometer by which to gauge business conditions. Of the entire list of 154 cities reporting, twenty-five show a decrease in employment, while ten show an increase in employment. Seven new cities report having apprentices, while two cities formerly reporting apprentices say they have none now. Of the 154 cities reporting, sixty-five of them are those which did not heretofore make any return to us. A deduction of the wages paid to the journeymen show that the median wage is $1.12½ per hour, while the average wage is $1.13½ per hour for the journeyman's help. Twenty-three cities give no rate for helpers.

In response to an invitation from the chair for suggestions from members for the use of the Resolutions Committee, Mr. Maloney of Gary, Ind., stated that the heating industry was bound to be in a serious predicament due to the raising of the bars against apprentices and that at present, with existing regulations calling for the maximum number of mechanics on a job, there were not enough mechanics available. He declared that the time had arrived for the association to assert itself against the prohibitive measures which were preventing young men from learning the trade and this condition he classified as an association responsibility which must be faced.

H. W. Jones, of Rochester, N. Y., asked why there were no more apprentices and helpers employed and available. In response Mr. Maloney told of a recent job where the cost of temporary heat amounted to $772.00 a week, due to steamfitters firing the boilers 24 hours a day, this being insisted upon by the local regulations. Mr. Maloney urged action on the part of the association to bring about an end of these evils and said the contractors owe this protection to the public. He said the possibilities must be faced of the public going on a buying strike as the result of such conditions, with resultant losses that would have to be sustained by the contractors.

Mr. Maloney criticised the regulations which provide for two steamfitters on a job instead of a steamfitter and helper. Frank W. Howard, of Boston, declared Mr. Maloney was right in his charge of unfairness regarding the temporary heat charges cited, but said that if the matter had been called to the attention of the International association under no circumstances would the over-time charges have been sustained.

Mr. Graves, of Chicago, told of the unreasonable regulations north of Chicago in Lake County and cited an instance where a union delegate insisted upon payment of the mechanics for one hour's traveling time in addition to the railroad fare to the job. This condition, he said, was due in part to the lack of organization among the contractors in the territory mentioned. William H. Driscoll, of New York, stated that if the condition mentioned by Mr. Maloney had been wired to the International association and to the headquarters of the H. & P. C. N. A. it would have been settled satisfactorily and promptly.

Tuesday Evening, June 2

Talks on "certified heating" and cooperative advertising were the main topics at the Tuesday evening session which was scheduled as an open forum. Chairman W. L. Fleisher of the Standardization Committee was the first speaker, his topic being "Figuring Radiation, B.T.U. vs. Old Rules." Mr. Fleisher's talk was illustrated by lantern slides. He presented the methods which were adopted last year by the association and which have been embodied in the association's loose-leaf book, "Engineering Standards" and showed how the use of these standards linked up with the practice of "certified heating." As Mr. Fleisher stated, the estimating tables for different cities now cover Birmingham, Boston, Buffalo, Chicago, Cleveland, Denver, Detroit, Kansas City, Los Angeles, Madison, Wis., Memphis, Milwaukee, New York, Philadelphia, Pittsburgh, San Francisco, Salt Lake City, St. Louis, St. Paul and Washington, D. C.

PROGRESS OF "CERTIFIED HEATING"

Harry M. Hart told of the adoption of "certified heating" in Chicago.

L. W. Moon, of St. Louis, gave the experiences of the St. Louis association with "certified heating." He stated that the plan was started early in the spring of 1923. Advertisements were published in a St. Louis daily once a week. This was supplemented by a pamphlet explaining "certified heating." A standard size for each "certified heating" build-

ing was published and used by the members, stated Mr. Moon. The association adopted the slogan, "Heat, Not Hot Air" and this was changed later to "Certified Heating is as Good as a Bond." Advertising copy, he said, was also directed to the owners of old buildings, as well as to new building operators. The plan was applied not only to residences, but to garages, factories and office buildings.

In answer to a question why the Chicago association had limited its guarantee to bungalows, residences and apartment buildings under four stories, Mr. Hart stated that the idea was a new one with the association and it was thought best to proceed slowly. The association did not want the heating engineers to feel that the contractors were encroaching upon their sphere of activity.

What "Certified Heating" Means to the Industry

Mr. Hart spoke of the advancement in the art of heating during the past few years, yet the industry, he showed, from the standpoint of the heating contractor, has much room for improvement. He stressed the importance of associations being well organized and he suggested as the best means of accomplishing this to make the organization so attractive and necessary to the individual contractor that he cannot afford to stay out of it.

The next step, he pointed out, is to keep the confidence of the public, and how better, he asked, can this be accomplished than by the adoption by an association of "certified heating." He told how "certified heating" had been adopted in Brooklyn, St. Louis, Memphis, Los Angeles and Chicago, being entirely under the control of the local associations in those cities. He considered this the most advisable procedure as a starter on account of the large amount of detail work involved.

"It is obvious," continued Mr. Hart, "that if we are to adopt 'certified heating' there will be something to which certifying refers. Your Standardization Committee has been devoting a great deal of time to compiling, checking and boiling down data that can be used for that purpose.

"CERTIFIED HEATING" IN CHICAGO

"'Certified heating' in Chicago means that our association, which is a voluntary organization, has adopted a set of minimum requirements governing the design and installation of heating systems in bungalows, residences and apartments of not over three stories. When such an installation is made by one of our members, this association requires that it be installed in accordance with these minimum requirements and the owner of the building is given a certificate to that effect. The owner of the building then has not only the guarantee of the heating contractor but the guarantee of the association as well.

THE FIRST STEP IN THE ADOPTION OF "CERTIFIED HEATING"

"The first step toward the adoption of 'certified heating' is the adoption of standards for installation, then the organizing of an engineering department where working drawings should be submitted and approved before the installation is made.

"Then a competent inspector must be employed whose duty will be to inspect each installation to see if it is properly installed and complies with the approved plans.

"For the purpose of identification it is desirable that each job be given a serial number. Then if the inspector finds the job O.K. a written certificate is mailed to the owner, and a plate bearing the serial number of the job, the heating contractor's name and the name of the local association is attached to the boiler."

Mr. Hart emphasized the importance of providing proper publicity and showed some of the literature sent out by the Chicago local association to architects, building contractors and owners who take out building permits.

EFFECT OF "CERTIFIED HEATING" ON ASSOCIATION MEMBERS

Among the advantages secured through the adoption of "certified heating" Mr. Hart cited the better standing in the community which would be attained by every member of the association and the elimination of that part of competition which heretofore has been the greatest detriment to the industry, namely the "skinning" of jobs in order to get business. "Under the rules of 'certified heating,'" stated Mr. Hart, "our members can skin themselves, but they are not permitted to skin the public. Now, where the contractor is permitted to skin the public, his opportunities are almost infinite in a fast-growing community, but where he is only permitted to skin himself his activities along that line are obviously quite limited. The individual, if he wishes to continue in the business, will have to make a profit on his work. There is never any objection from the public to this. They do not like to do business with a contractor who is losing money. Such a contractor is quite generally considered not only a detriment to the industry in which he is engaged but to the community in which he lives as well.

"The competition then will be on an entirely different basis than heretofore. Instead of competing to see who can sell the cheapest kind on an installation we will be competing to see who can sell the best one. And when he has secured a contract, instead of confining his activities to trying to find further means of cheapening the job, he will devote some thought to the kind of service he is giving the owner.

"It would seem that that would be a much healthier line of competition for every one concerned. And I can see no reason to fear a competitor who is conducting his business to the best interests of the industry."

Referring to the outsider under such a plan Mr. Hart said:

"It would seem to me that no matter how good a reputation I had built up for my business as an individual contractor I would much rather be on the inside of an organization doing 'certified heating' than out. The only advantage the outsider would have would be with some unscrupulous general contractor (if there are any) who would not be interested in the kind of a system that was installed in his buildings; and, with proper publicity I think that such a general contractor would *have* to give 'certified heating' every consideration."

"'Certified heating,'" declared Mr. Hart, "is not only worth the effort, but is bound to come whether we want it or not." In support of this statement he told of the movement inaugurated by the National Association of Real Estate Boards whereby each purchaser of a home will be given not only a certificate as to the heating system, but to the entire house. No one is better qualified nor would it be wise, he said to have any other dictate what the specifications for "certified heating" should be than the heating contractor.

In answer to a question as to the concrete benefits received by the St. Louis association Mr. Moon stated that one of the first results noticed was a better standard of workmanship and the disappearance to a degree of a so-called "skin-job." Another result, he said, was better competition. The plans have also proved beneficial to the union men in the shops.

Referring to Brooklyn's experience with "certified heating" Mr. Emery stated that the plan had been carried out along the same lines as in St. Louis and Chicago, but that it was too soon to say how far the plan had been instrumental in increasing the membership.

Speaking of the attitude of the public towards "certified heating," Mr. Hart said that the architects and owners welcomed the plan and that members reported receiving preference on competitive jobs over non-members, due to the plan. Mr. Emery said that in Brooklyn the public had been urged to have all

praisals made of heating plants before taking title to a building.

Among others who lauded the plan were N. A. Patterson and George M. Getschow of Chicago who said that the plan was a big one, bigger than is generally realized. The standards of the Chicago association, he said, have really provided "certified heating" in Chicago for several years. He declared it would not be long before the tenant, upon renting a house, would ask if the building had certified heat and that an effort should be made to induce the public to exercise this preference.

For the manufacturers J. B. Bernhard, of the Bernhard Boiler Company, stated that without a doubt "certified heating" would help the boiler manufacturers.

Mr. Jones, of the National Trade Extension Bureau, stated that he had been listening to the discussion, not as a heating man, but as a professional advertising man, and had been impressed with the fact that every word spoken had been in the interest of protecting the public. He asked why keep it a secret, and urged the association to broadcast the plan to the public the country over. He added that advertising properly directed and sustained was never an expense, but always an investment.

Collective advertising, he declared, was the answer to the problem of getting the plan before the public and he showed several slides of advertisements which could be changed slightly so as to apply to the plan. These slides, he stated, had been gotten out for contractors by the Trade Extension Bureau. He emphasized the importance in advertising to the public of using its own language and not stressing things hard for the public to understand, such as standards, ratings and similar terms. He offered the co-operation of the Trade Extension Bureau in furthering the "certified heating" movement.

Wednesday Morning, June 3

After Treasurer H. W. Jones had presented his report, the report of the board of directors was read by M. L. Crowell, chairman.

REPORT OF BOARD OF DIRECTORS

Details were given in the report of the actions taken since the last convention to give force and effect to the resolutions passed at that time. One of these resolutions was to the effect that steamfitting is a two-man trade, requiring the services of one helper for each steamfitter employed on such work. The report told of the meeting of the association's committee with representatives of the United Association of Plumbers and Steamfitters. As a result, the United Association appointed a special conference committee, but as yet the conference between the two committees has not taken place.

The report referred to the work done by the association's Committee on Boiler Ratings and to the keen interest taken in the subject by the board.

Commenting upon the resolution passed last year with a view of extending the use of the association's standards, the report stated:

"Resolution No. 3 directed that there be invited into a conference the American Society of Heating and Ventilating Engineers, the National District Heating Association, the National Boiler and Radiator Manufacturers' Association and the American Society of Mechanical Engineers, with the idea of having the representatives selected by them act as sponsors in conjunction with this association for developing and adopting uniform rules and methods for the calculation and design of heating systems.

"This resolution was referred to the Committee on Standardization, with instructions to foster this movement. Your board of directors feels that this committee is best qualified to explain our standards and to justify them."

The board reported the organization of two new locals during the past year, one at Grand Rapids, Mich., and one at Minneapolis. It is probable a local association will be established in Detroit.

"The comprehensive program of the Standardization Committee," continued the report, "as laid down several years ago in reference to the uniformity of our engineering calculation and design, may be said to be fairly well completed in some important particulars. It appears at this time that by the next convention the necessary additional features will have been determined and established. Your board would urge the members to use these standards and to take it upon themselves, upon every possible occasion to bring about their use by engineers and architects everywhere.

"Such extension of their use will not only benefit our association but also the entire industry. Your board is firmly of the opinion that the determination and establishment of the standards, including boiler ratings, is the most vitalizing force in our association work. This is so because it forms the very foundation for Certified Heating and Co-operative Advertising which promise to elevate the business of our members from the dead level of competition with mediocrity to the heights of guaranteed and quality installations."

An increase in the association's membership was reported. The report recommended the election to honorary life membership of George Hall Morris, of New York.

"The new method of pricing radiation," stated the report, "has been in effect for two years. This has not been brought to the attention of the board officially during the past year. If the general effect of this has been for good, or for evil, it is hoped that a discussion at this convention will crystallize the sentiment of the members."

Other reports presented at this session were those of the Credential Committee, F. H. Meadows chairman, and of Secretary Henry B. Gombers.

SECRETARY'S REPORT

One of the important sections of Secretary Gombers's report dealt with the live subject of trade ethics. On this topic he said:

"When the great increase in amount of business is considered it would seem to be a source of congratulation that there has been comparatively little time spent in ironing out disputes or adjusting of differences such as were in evidence a number of years ago where a national question was involved.

"It may be that our desire to use our good offices whenever called for in that direction has acted as a deterrent—at any rate, we wish it to be known that we are advocates of peaceful methods of settling disputes or misunderstandings.

"In all fairness to the manufacturer and to the jobber it can be said that they are occasionally sinned against, but how often it is said that the jobber gives unreasonable credit to a certain class of contractors who become competitors of a better class of contractors who are the responsible and best customers of manufacturer and the jobber.

"Why is it that some jobbers seem to delight in carrying along so many lame ducks who are quite certain to flop their broken wings and lie down at any moment?

"Look over the list of failures—bankrupts—for a period of several years last past; and what do you find? Strewn along the road are those who do not do business on business principles and such are usually to be found on lists of those who make up the debtors whose names are filed by the creditor.

"We recently received a letter from one of our Western local associations in which we were told that an effort is being made to correct evils existing in the building industry in that city.

"Architects, consulting engineers, bankers and the public are represented on what is known as the 'Associated Building Crafts Committee,' which committee owes its existence to our local association of the city in question.

"It is said that a code of practice is being formulated which will doubtless be of great general good to all whom it affects.

"Any method devised to bring about proper co-operation between the various divisions of our industry that will tend to eliminate abuses ought to be welcomed by all; and we shall await with great interest developments in the plan adopted by the industry in the western city to which we have referred."

An address entitled, "Can Secretary Hoover Help the Heating Industry" was delivered by Major A. E. Foote of the U. S. Department of Commerce. In introducing Major Foote, President Merrill

stated that Secretary Hoover had done much to help the heating industry, as well as practically every other industry in the country.

Major Foote read a personal greeting from Secretary Hoover, who wrote:

"I hope you will also have an opportunity to express my faith in the great national values of constructive trade association work. I can see no adequate method of solution of many of the problems of common interest, problems which at the same time have vast public implications in greater stability to business, greater economics in production and distribution, greater conservation of our natural resources, improved skill and business ethics—I can see no adequate solution for these except through sound trade association organization."

Major Foote said in part:

"Too much variety in the wide range of articles entering into the heating and ventilating business is undoubtedly placing an additional burden of expense on the manufacturers of such fittings, the distributors who handle them and the home builder or building owner who must use them.

"For four years," Mr. Foote continued, "the Department of Commerce has been serving as a headquarters for the war on wastes of this sort, and Secretary Hoover's work in this direction has saved American industry hundreds of millions of dollars. Too much variety has led to innumerable instances of excessive manufacturing costs unduly high inventories and selling expenses, seasonal occupation, and many other handicaps—all of which have been paid for by the consumer.

"Doing away with varieties arising from dimensional differences in any set of commodities may be brought about by one or both of two methods—standardization and simplification. Standardization, the development through long and careful study of what is the best, is a desirable achievement. Simplification, the forerunner of standardization, offers a short cut and more immediate benefits while studies are carried on preliminary to standardization. It is based on the actual figures as to the existing variety and the demand for the items making up such variety. It gives in concrete form information as to what make up the slow-moving items, those which are in infrequent demand, those which are perhaps obsolete. It furnishes a basis for the joint consideration by the producer, the distributor and the user of what items can be eliminated so that the manufacturer may benefit by concentrating his efforts on the production of 'live' items.

"Before continuing," said Mr. Foote, "I must pay a compliment to your association for being a pioneer in standardization. Your history shows that as long ago as 1894 you were at work on standards for flanges, and that in 1912, 1915 and again in 1923, your organization was undertaking other standards in co-operation with the American Society of Mechanical Engineers. Your further work toward the standardization of forms of contract and your research work in developing standards of radiation convince me that you need no discussion of the value of standardization.

"Up to date more than 43 industries have applied this remedy to their problems. And by co-operation and by concentration on the commonly used items, as 'regulars' and the placing of the seldom-used or 'freak' items in their proper class as 'specials,' the results are beyond the fondest hopes of many industrial leaders.

"I am encouraged to believe, by your efforts toward standardization, that your organization will consider at this convention whether it can not apply simplified practice to your industry and will name a committee to work toward simplification in any direction which will be of the greatest benefit to yourselves and your clients—the home building public. With such action taken, I can pledge you the fullest co-operation and facilities of the Division of Simplified Practice and the Department of Commerce as a whole."

President Merrill said that the association is vitally interested in the reduction of costs and the increase of efficiency and that it has been trying to eliminate waste. He asked that Major Foote take up the matter of simplified practice with the association headquarters with a view of arranging for a survey of the industry. President Merrill added that a movement was on foot to eliminate waste in radiator manufacture and that it might be possible to make water radiators at less cost than steam radiators. He asked Major Foote to assure Secretary Hoover that the association was back of him in his splendid work.

Two important committee reports were presented at this session, the first being that of the Committee of Standardization, W. L. Fleisher, chairman. This report was enthusiastically received by the convention and was adopted unanimously.

New Standards Adopted for Radiator Supply Valves and Cast-Iron and Malleable Screwed Fittings

At the outset of his remarks Walter L. Fleisher, chairman of the committee, likened its work to the impetus of an advertising campaign such as that conducted for Smith Brothers cough drops. In the case of the cough drop manufacturers statement was made that the advertising that had been done would carry them over five years without a noticeable drop in their sales. The work of the Standardization Committee, said Mr. Fleisher, has had it greatest publicity this year although its most extensive work had been done in previous years.

"The Standardization Committee," continued the report, "has been called from its regular committee work to act in various capacities on many other committees specializing in standardizing and standardization. It has also been called upon to act as watch-dogs over standards that their associates and other individuals were attempting to place before the public, which standards were not satisfactory to your committee and which, if accepted, would have upset the work which they felt they themselves had done better than others."

Further on the report stated:

"The American Society of Heating and Ventilating Engineers, as you know, are working zealously on their code of minimum requirements which embraces the work that we have already carried further than they, and the American Engineering Standards Committee has included us as sponsors since the very start of the work.

"During the year, meetings were held between your Committee on Standardization, or members thereof, and the American Society of Heating and Ventilating Engineers with the idea of bringing the interests of the two into accord. Although no definite accord has yet been reached, distinct progress has been made in this line."

"The committee," added the report, "has also worked in conjunction with the American Engineering Standards Committee on cast-iron and malleable pipe and fittings and is contemplating publishing in its own Engineering Standards book the results accomplished through its assistance by the American Engineering Standards Committee."

Mention was made in the report of the fact that in the various meetings of the committee it has corrected and augmented methods of figuring radiation. Errata in the foreword have been corrected, various discrepancies which have been called to the committee's attention have been re-examined and, where necessary, have been corrected. Additional base temperatures have been developed for a number of cities and the committee has started and has completed part of its work in the standardizing of pipe sizes, particularly in connection with one-pipe up-feed systems. It is now working on and will probably have ready for publication within the next few months standards for two-pipe and vacuum heating systems. There are also sub-committees working on water heating systems, both gravity and forced circulation.

ROUGHING-IN STANDARDS FOR RADIATOR VALVES THE RESULT OF MANY YEARS' WORK

"One of the real accomplishments of your Committee on Standardization," continued the report, "has been the recommending and actually the obtaining of standardized roughing-in dimensions for radiator valves. It is rather difficult in reading over the results which are so simple as to appear negligible, to realize that this work was taken up by the Committee on Standardization of your association in 1911 and only brought to a head this year.

"We believe that it was only the insistence upon the manufacturers conforming to the standards set by our association in connection with vacuum return valves which led the thirty-eight manufacturers of steam valves to realize the force of our work.

"When one realizes that after the 1st of January, 1926, our members can rough in steam connections for all radiators without any regard to the valves that they are going to use, that these roughing-in dimensions are of such concrete and standard lengths that is simple to inform the journeyman steamfitter of the required space, I feel that for this alone, if we had done nothing else, the existence of your committee would have been justified."

In this connection Mr. Fleisher cited the case of one of the largest jobs let this year requiring return-line valves, where a manufacturer who refused to conform to the association's standards was given the option of following the 3¼-in. standard or losing the order.. "It required very little persuasion," stated the report, "for him to fall in line and to agree to follow the specifications calling for the roughing-in dimension of 3¼ in."

Mr. Fleisher also showed how the impetus of the work of the committee had created new interest in the standard form of proposal which the committee compiled some six years ago. He stated that it was the purpose of the committee, in the light of the work that has since been done, to go over these proposals and bring them up to date.

"During the past year," continued the report, "we have augmented the Engineering Standards so that they now include sheet-metal connections for indirect and direct-indirect radiation, and we soon will have ready standard methods of connecting boilers."

In connection with the work on which the committee is now engaged in formulating data on pipe sizes and methods of piping heating system, it was stated that this has turned out to be a task of much greater proportion than was anticipated, and it was announced there will be much work on this subject, not only this year, but next.

"In connection with our work on pipe sizes," stated the report, "we discovered that all previous work had been carried out without adequate knowledge of critical velocities in the large sizes of pipes —I mean above 2 in. in size—and that to give accurate results, tests would have to be made on these larger sizes. We have interested the Research Laboratory of the American Society of Heating and Ventilating Engineers and your board of directors, so that arrangements have been made for carrying on this work in the Research Laboratory in Pittsburgh."

DATA ON CHIMNEY SIZES IN PREPARATION

Additional data, it was announced, on chimney sizes, covering both height and area, will be placed on the program for the coming year, indicating the character of accurate knowledge on which the committee is working. The chairman cited a comment made by an engineer of the American Radiator Company who informed him that a chimney built on the outside wall of a building showed a difference in capacity of at least 20% from one on the inside.

BEARING OF STANDARDIZATION COMMITTEE'S WORK ON "CERTIFIED HEATING"

In concluding the report Mr. Fleisher stated that his one great dream in connection with standardization was that it should be made the means of obtaining a greatly augmented membership and that this could only be done by the national association guaranteeing or sponsoring "certified heating," and standing back of its members if the heating system was installed in accordance with these standards.

"There is only one way," declared Mr. Fleisher, "that this can be accomplished and that is by every member of this association standing back of the work that your Committee on Standardization has done and seeing to it that it receives the support from within our own organization that we expect it to be accorded from without."

Following are the standards which were presented by the committee and which were unanimously adopted by the convention.

STANDARDS FOR RADIATOR SUPPLY VALVES EFFECTIVE JANAURY 1, 1926

1. The following dimensions, centre of valve to face of outlet, are adopted as standard:

½-in. valves	2¼ in.
¾-in. valves	2¾ in.
1 -in. valves	3 in.
1¼-in. valves	3½ in.
1½-in. valves	3¾ in.
2 -in. valves	4¼ in.

2. Said standard dimensions also apply to union elbows.

3. Said standard dimensions apply to modulating valves, *with the exception of the ½-in size*, on which the dimension shall be 2¾ in.; in other words, the same as applies to the ¾-in. valve.

4. A tolerance of plus or minus is allowed of ⅛ in.

What many considered the high point of the convention was reached in the report of the Committee on Boiler Ratings by George M. Getschow.

Boiler Rating Committee's Solution of Rating Problem

"Our thirty-fifth annual convention one year ago, by resolution, gave birth to what was called the Boiler Rating Committee. It instructed your president to appoint on this committee, five members from different cities, specifying the cities from which the selection was to be made.

"Your president appointed W. L. Fleisher, of New York; M. J. Crowell, of Cleveland; J. H. Hicks, of St. Louis; President Frank A. Merrill, acting ex-officio, and your humble servant from Chicago. This comprised the committee that was to go out into the wilderness of boiler manufacturers with their forests of chimneys working night and day, passing B.T.U. into the atmosphere, in striving to find the correct answer to the question of boiler ratings. And this by many boiler manufacturers had been indulged in more or less for the last twenty-five years.

"I ask you to visualize the magnitude of the undertaking which confronted your committee with no instructions, no particular engineering data, and, in the final analysis, very little experience in the particular line at which they were expected to function, that of boiler ratings. Your committee, however, had hopes and saw just one ray of sunshine in the Western skies where our Chicago local had made material advances in standardization work including the question of boiler factors based on test data furnished them by numerous manufacturers of house-heating boilers.

"It was, therefore, quite natural and expedient for your committee to seek and request such data and information from the Chicago local.

"We were all agreeably surprised and sincerely thankful when the Chicago local instructed two members of their standardization committee, Harry M. Hart and Charles Lamb, to be present at the first meeting of our committee, to give them assistance and an explanation of the boiler formula and procedure of test for low-pressure heating boilers which had previously been adopted by our Chicago local.

"After careful study and thought and for the purpose of having some basis to start from, your committee formally adopted the same.

"Your committee then immediately adopted the following resolution:

"RESOLVED, that the National Boiler and Radiator Manufacturers' Association be notified that the Committee on

Boiler Ratings of the Heating and Piping Contractors National Association has adopted the Chicago Code at a meeting held September 16, 1924, and that copies of this code be submitted to the National Boiler and Radiator Manufacturers' Association and the American Society of Heating and Ventilating Engineers, with a request that the same be submitted to their respective committees for early consideration.

"Both associations were immediately notified with copy of resolution attached. We did not meet with any response from the American Society of Heating and Ventilating Engineers but enjoyed the pleasure of a prompt reply from the National Boiler and Radiator Manufacturers' Association, which in due time appointed a committee to confer with us and shortly thereafter the first meeting was arranged for.

"Your committee again felt the need of assistance from our Chicago local and received the same promptly.

"H. M. Hart and Charles Lamb were present at the first joint meeting to assist your committee in presenting to the boiler manufacturers' committee, the boiler formula and procedure of test previously adopted by us. At this meeting the Boiler Manufacturers' Advisory Committee asked that Mr. Hart and Mr. Lamb be requested to continue to attend the conference of the Joint Committee, which was unanimously adopted by the Joint Committee. The two gentlemen have attended every meeting and have been of great service and assistance throughout the numerous conferences during the past year.

"It developed in the early joint meetings that the question of boiler ratings concerned the manufacturers of low-pressure heating boilers quite as much as the engineer and contractors and that if some solution could be found or arrived at, which would be equally fair and right to the manufacturers of boilers, the heating engineers and contractors, and the public, it would be the most important advance made in our industry for many years. With this firmly in mind, the Joint Committee in their enthusiasm, went to work on the question with all the energy at their command. It developed very shortly that our name 'Boiler Rating Committee' was not the correct one and that boiler rating was not a question for joint conference. Your committee believes that each individual manufacturer of boilers is at liberty and free to use his own judgment as to ratings he desires to place and catalogue on his boilers. Your committee therefore concluded that the correct name of our committee should be 'Boiler Output Committee' and that the question of future joint conferences should be along the lines of boiler output and standard method of testing and charting the same.

"Many meetings were held during the past year with the advisory committee of boiler manufacturers and many setbacks took place. At times it appeared that it would be impossible to analyze the many ramifications and reach the goal for which we were striving.

"Early in the conferences your committee learned that the National Boiler and Radiator Manufacturers' Association had adopted the standard code for testing low-pressure heating boilers, as adopted by the American Society of Heating and Ventilating Engineers.

"This code is very similar to the code adopted by your committee and with few exceptions meets with our approval. Our efforts were now directed as before stated on boiler output. Your committee's contentions are that as purchasers of low-pressure heating boilers we were certainly entitled to know and therefore entitled to ask from the manufacturers the necessary information as to performance of their boilers under certain conditions. We were pleased to report that many boiler manufacturers are heartily in accord with this request. Your committee then prepared specification and charts and submitted the same to the Advisory Committee of Boiler Manufacturers for their consideration and after numerous conferences, we are pleased to say the same meets with their approval.

"We were then given an opportunity to present our specification and charts to twenty-two individual boiler manufacturers assembled in New York City, who heard our report and carefully analyzed our request. We were assured by these individual manufacturers of house-heating boilers present, that they were in sympathy with our report and gave us their assurance that they would adopt our diagrams, formula and standard form of output tests and give us the information desired.

"Your committee is of the opinion that it will be only a matter of a short period of time when practically all of the individual manufacturers of house-heating boilers will adopt your committee's recommendations.

"The boiler manufacturers realize that this is a large undertaking and will require an expenditure of vast sums of money, nevertheless, they are willing to go into the tests with this before them realizing the benefits that will accrue to the heating industry, including the manufacturers, the engineer and heating contractors and the public whom we serve.

"Your committee is confident and realizes that a vast amount of progress has been made, but also the work undertaken is not complete. We do, however, wish to impress upon the members of this association the progress made and the great step that has been taken which will eventually so materially advance the industry. Your committee, therefore, recommends to the convention that a Boiler Output Committee be continued with power to revise from time to time, if necessary, the diagrams, formula and standard form of output tests and for the purpose of receiving the boiler manufacturers' test data from time to time and for the further purpose of assembling such data and prepare the same in simple form so that all of our members can readily understand and intelligently use the same."

Herewith follows the specifications which will govern:

Diagrams, Formula and Standard Form of Output Tests for Heating Boilers of the Heating and Piping Contractors National Association

METHOD OF TEST

All tests on low-pressure heating boilers shall be made in strict conformance to the Standard Code for Testing Low-Pressure Heating Boilers as adopted by the American Society of Heating and Ventilating Engineers, January 1924, except as hereinafter provided for.

CHIMNEY

The boiler undergoing tests shall be connected to a chimney of appropriate area and height. It is recommended for the sake of uniformity that the attached chimney chart be used.

Height shown on chart to be maximum height permissible.

For area shown on chart, a tolerance of plus or minus 20% shall be allowable.

FUEL

When anthracite fuel is used in test it shall be of stove size, of approximately 12,500 B.T.U. dry fuel, heat value per pound.

When bituminous fuel is used it shall be free burning, of approximately 13,000 B.T.U. per pound dry fuel, heat value and contain 30% to 40% volatile.

METHOD OF FIRING

For anthracite:

The firing period, without attention, for burning anthracite fuel shall be as follows:

For Steam Boilers

With 8 sq. ft. grate or less..8-hour period
With 8 to 12 sq. ft. grate..6-hour period
With 12 to 18 sq. ft. grate..4-hour period
Over 18 sq. ft. grate.....2-hour period

For bituminous:

Hand-fired attention as required (standard attention given).

NUMBER OF TESTS

Test No. 1—At rate of output at which boiler shows the highest efficiency.
Test No. 2—At 33-1/3% below the rate of output in Test No. 1.
Test No. 3—At 33-1/3% above the rate of output in Test No. 1.
Test No. 4—At 66-2/3% above the rate of output in Test No. 1 if possible.

with firing period as given under Method of Firing, and 25% reserve fuel.

Test No. 5—At maximum rate of output with firing period as given under Method of Firing and 25% reserve fuel.

The following condition shall govern when establishing output capacity of steam boilers:

STANDARD PERFORMANCE CHARTS

A performance chart on each boiler shall be made (similar to the attached form) on which five curves shall be indicated as follows:

A. Curve indicating the efficiency of the boiler at the diffrent outputs given.
B. Curve indicating the weight of fuel burned per hour at the different outputs given.
C. Curve indicating the flue gas temperature at the smoke outlet of the boiler at the different outputs given.
D. Curve indicating the net draft tension in inches of water at smoke outlet of boiler at the different outputs given.
E. Curve indicating the time in hours one adequate fuel charge will last with 25% reserve at the different outputs given.

Indicate on chart area and height of chimney used for each test.

BOILER OUTPUT

The boiler output shall be expressed in square feet of direct radiation, equivalent to 240 B.T.U. per square foot per hour, computed on the following formula:

$$\text{Steam Boiler } \frac{W \times H \times E}{240} = \text{Output}$$

W = Average dry fuel burned per hour in pounds for period of test.
H = Heat value per pound of dry fuel in B.T.U.
E = Efficiency of boiler.
Output = square feet of direct radiation.

$$\text{Water Boiler } \frac{W \times H \times E}{150} = \text{Output}$$

GUARANTEE

The results of all boiler tests submitted shall be certified and guaranteed by the manufacturer.

The committee's report was enthusiastically adopted without a dissenting vote. Mr. Getschow expressed his thanks for the association's support, and upon his motion it was voted to send a copy of the report to each member.

President Merrill called upon Secretary Herendeen of the Boiler and Radiator Manufacturers' Association who paid tribute to the hard work, and careful and capable thought that had been given to the subject by the association's committee. He expressed his judgment that the result would be a great one and that everyone in the industry would benefit from it.

It was voted to continue the work of the committee which, at the suggestion of Mr. Getschow, will be known hereafter as the Committee on Boiler Output.

Thursday Morning, June 4

At the opening of the Thursday morning session Chairman H. A. Snow, for the Membership Committee, reported the gratifying results obtained during the year in enlarging the association's membership. A gain of 152 members was reported, with four applications still pending. The total membership is now 776.

President Merrill then expressed his pleasure at the complete registration figure of 603 reported in attendance. F. W. Howard reported for the Association Improvement Committee. Following this report Secretary Gombers read the questions that had been placed in the question box.

For the secretaries, C. W. Sisson reported that at the meeting held during the convention sixteen secretaries were in attendance and the consensus of opinion was that more of these meetings should be held during the year. The meeting went on record as being ready to discourage the practice on the part of large industrial companies of doing their own heating work, employing their own men to do it and buying the materials direct from the manufacturer.

Mr. Sisson also stated that the meeting, in discussion "certified heating," recognized it as a means for promoting better results with the public and he suggested that special committees be appointed to carry on this necessary work.

H. A. Snow, of Boston, told of an apprenticeship commission in Boston which formed a part of the activities of the Boston Building Congress. This commission, he said, had done some excellent work, which unfortunately, had not embraced the heating industry. He stated also that Mr. Oakes, one of the Boston members, was active in the work and was ready to extend his co-operation.

Vice-President William H. Driscoll spoke feelingly of George Hall Morris of New York, and the large part he had played in the progress of the building industry in the metropolis. Mr. Driscoll also spoke of Mr. Morris's long connection with the trade, extending over 43 years as a heating contractor, and how he had, on many occasions, sacrified himself in the cause of progress in the heating industry, even to the extent of impairing his health. A letter from Mr. Morris was read expressing his regret at not being present due to illness. On Mr. Driscoll's motion, the convention then elected Mr. Morris an honorary member.

In response to a question submitted by M. J. Kickum, of St. Louis, asking why it was that associations did not seem to make the progress that appears so necessary, and asking if the reasons could be laid to finances, inferior management or the over-loading of underpaid secretaries, and closing with a plea for more action, Mr. Driscoll stated that the last mentioned was the root of the trouble. This lack of action, he continued, was not on the part of the secretaries or the officers or committee members, but rather was due to the lack of interest and co-operation on the part of members, and he made a plea for more action on their part. A suggestion made by G. L. Rudd, of Chicago, was that the country be divided into zones or sections in which quarterly meetings could be held, in the same fashion as some of the associations in the large cities conduct sectional meetings. These quarterly meetings, Mr. Rudd said, would result in a more frequent exchange of ideas with gratifying results. The association, he declared, knew how it stood, but never had the opportunity of meeting the other fellows cutside of the organization.

The scheduled talk of oil-burning, it was announced, had been passed by, due to the fact that no speaker on the subject was available.

Resolutions

Among the important results presented to the convention were the following:

That a request be sent to the Association of Boiler and Radiator Manufacturers to have radiators cleaned, dipped, painted and plugged at the factories. Adopted.

That losses in estimating be eliminated by all members refusing to submit bids on jobs where the member does not receive adequate plans and other information on the job for his use long enough to make an intelligent estimate. Adopted.

That conferences be arranged with the various real estate boards, using the association's standards as the basis, with the local associations co-operating in the own-your-home movements. Adopted.

That in the interest of simplification a request be made to manufacturers to stop the making of steam-type radiators.

Considerable discussion followed the reading of the last resolution, the question arising whether or not water-type radiators would operate on one-pipe jobs to complete satisfaction. Mr. Hart stated that if difficulty was encountered it would be due to the improper placing of the air valve which should be located lower on the radiator. In answer to a statement that this was not altogether practical Mr. Driscoll stated that he had a one-pipe system in his home which had water-type radiators giving satisfaction.

Walter Klie, of Cleveland, made a motion that due to the differences of opinion displayed the board of directors should appoint a committee to which

this resolution should be referred. After more discussion this motion was passed and President Merrill requested Vice-President Charles A. Foster of the American Radiator Company to present his views on the subject.

Mr. Foster stated that in Europe water-type radiators have been used for steam heating with no trouble for a great many years, and that the two types of radiators, water and steam, had been built as the result of requests years ago from the heating contractors who complained that the use of the water-type sometimes made for air binding and also at times slowed up circulation. Manufacturers, he felt sure, would give the industry anything it demanded.

A resolution providing for representation of the association at the next meeting of the Board of Jurisdictional Awards, together with the usual resolutions of thanks were presented and adopted by the convention.

As the Resolution Committee completed its report, the convention was agreeably surprised with the announcement of the arrival of Mayor John W. Smith of Detroit.

President Merrill called John T. Bradley to the platform to welcome the mayor, who, it came out, pulled on die stocks many years ago as a steamfitter in the employ of Mr. Bradley. President Merrill also called Julius Zeisig of Detroit to the platform to supplement Mr. Bradley's welcome, since the mayor was also at one time employed in the trade with Mr. Zeisig.

Mr. Bradley read his welcome to the mayor which was interrupted when Mr. Bradley found it necessary to retire to the rear of the hall for missing pages of his speech. When Mayor Smith arose to address the convention he brought a hearty laugh from the delegates by stating that Mr. Bradley had acted like a typical fitter in having to go back for some of his material. The mayor said his old associations with the industry would always serve as an inspiration, and he took as much pride as any of the association's members in the vast development of the heating industry. He gave details of building progress in Detroit including its new $17,000,000 power plant.

ELECTION OF OFFICERS

The report of the Nominating Committee resulted in the re-election of President Frank A. Merrill, of Boston; Vice-President William H. Driscoll, of New York, and Treasurer Horace W. Jones, of Rochester. For the Board of Directors, William H. Driscoll, of New York; Walter Klie, of Cleveland, and J. S. Young, of Milwaukee, were elected to serve for three years.

At the request of President Merrill, former President Stewart A. Jellett conducted the installation ceremonies.

In again accepting the office of president, Mr. Merrill stated that he would continue the work with renewed enthusiasm and he outlined the great benefits that were certain to follow the work of the association along the lines of boiler output and "certified heating," with the public and the industry profiting greatly. He predicted a bright future for the industry and association and expressed belief that those outside the ranks would have to come in to participate in the great work being undertaken and being completed.

In presenting Vice-President Driscoll, Mr. Jellett stated that Mr. Driscoll was one of the hardest workers in the association. In reply Mr. Driscoll stated that he had in mind Professor Reed's remark that the most competent never reach office through our present system of election. It was a source of satisfaction, however, to him, he added, that he did not have to kiss babies and others as the true politician must to secure office. He pledged his efforts to serve the association and its officers.

Treasurer Jones was characterized by Mr. Jellett as the right man for handling the finances, while he presented Mr. Young and Mr. Klie as well qualified to dispatch their responsible duties as members of the board of directors.

Entertainment Features

Under the direction of a general entertainment committee headed by W. A. Russell, chairman, and A. H. Williamson, William G. Boales, Hubert Noble and George Cage, a royal entertainment was provided by Detroit manufacturers and jobbers. Those firms participating in the entertainment are as follows:

American Blower Company, American Radiator Company, Anchor Pipe & Supply Co., Capitol Brass Works, W. A. Case & Son Mfg. Co., Caton Pipe & Fittings Co., Commonwealth Brass Corporation, Crane Company, James E. Degan Company, Detroit Range Boiler Company, C. A. Dunham Company, D. & T. Mfg. Company, Excelso Specialty Works, Floral City Heater Company, General Boilers Company, Hammond Brass Works, Hart & Crouse Company, Hoffman Specialty Company, Ideal Furnace Company, International Heater Company Johnson Service Company, Kewanee Boiler Company, Kimball-Eisenberg Company, C. W. Locker, Michigan Lubricator Company, McRae & Roberts Company, Mueller Furnace Company, National Radiator Company, Park & McKay Company, Pierce, Butler & Pierce, F. C. Purcell, Richardson Boynton Company, Roberts Brass Mfg. Company, Murray W. Sales & Company, Scott Valve Mfg. Company, Standard Sanitary Mfg. Company, Sterling & Skinner, Thermal Appliance Company, United States Radiator Corporation, Utica Heater Co., Walworth Mfg. Company, Warren Webster & Company.

On the opening night a "get together" party was held in the ballroom of the Book-Cadillac Hotel for the delegates and guests. The Chicago delegation was over 130 strong and arrived Monday afternoon on a special train in time for the "get together" party. A vaudeville program was rendered followed by dancing.

On Wednesday afternoon the conventionists had the choice of an automobile trip through Detroit, with stops at the Ford and other plants, or a round of golf at the Essex, Grosse Ile or Red Run clubs, while the ladies were given a luncheon and card party at the Detroit Yacht Club.

In the evening motor buses and private cars conveyed the delegates to the Blossom Heath Inn where a dinner dance was staged. This marked the climax of the entertainment activities and was largely attended.

The ladies' events were in the hands of a committee headed by Mrs. J. P. McIntire, chairman. The other committee chairmen were: Golf, George Cage, chairman; transportation, C. T. Morse, chairman; dinner dance, J. F. G. Miller, chairman.

Seventieth Anniversary of Crane Company

Tracing the development of seventy years, begining with a single workman —the founder, R. T. Crane—down to the present time, with 17,000 employees on the pay-roll, R. T. Crane, Jr., president of the Crane Company, opened the seventieth anniversary convention which was held in Chicago late in May. The guests of the company at this celebration were nearly seven hundred of its employees who have served for twenty-five years or more.

A replica of the original one-room frame building in which the founder started business, had been erected on the lawn in front of the Corwith plant, which stands in grounds half a mile square. The Crane Company provided an elaborate program of entertainment extending over a week for the employees and their families. A special train from the Bridgeport, Connecticut, factory carried a party of 165 employees, all of whom had been with the company twenty-five years or more. There were also delegations from the factories at Chattanooga, Trenton, Birmingham and Montreal, as well as smaller groups from many of the one hundred and forty-eight branch offices.

Add $28,000,000 to Value of Cast-Iron Heating Boilers Sold in 1923

Through a typographical error in last month's issue regarding the total sales of cast-iron heating boilers in the United States in 1923, the figure was given as $3,799,869, whereas it should have read $31,799,869. The correct figure, however, appeared in the tabulation accompanying the article.

Ara Marcus Daniels, Washington, D. C., for the past eleven years associated with the United States Department of Agriculture, in design and investigational work in the heating field, announces his resignation from this position. Mr. Daniels has opened an office in Washington, where he will practice as consulting engineer in the heating and ventilating field.

OIL BURNING

Correct Installation of Oil-Storage Tanks

(Continued from Data Sheet No. 48-D)

When located within building, or above ground, the aggregate capacity of the tanks used in connection with the system shall not exceed 275 gal.

E. Where local regulations permit the use of gravity or pressure feed only from tanks of less than 60 gallon capacity, known as auxiliary tanks, the inside or above ground storage tank shall be limited to 215 gallons.

D. A test well or gauging device shall be installed on all tanks, and be so designed as to prevent escape of oil or vapor within the building. Gauges employing glass parts, the breakage of which would permit the escape of oil or vapor shall not be used.

Tanks shall be buried underground with top of the tanks not less than 2 ft. below the surface of the ground, and level of any piping to which the tanks may be connected, except that in lieu of the 2ft. cover tank may be buried under 12 in. of earth and a cover of reinforced concrete at least 6 in. in thickness provided, which shall extend at least 1 ft. beyond the outline of tank in all directions; concrete slab to be set on a firm, well-tamped earth foundation. Tanks shall be securely anchored or weighted in place to prevent floating, where special conditions make it necessary.

Where a tank cannot be entirely buried, it shall be covered with earth to a depth of at least 2 ft. with a recommended slope on all sides of not less than 3 to 1, but under no circumstances shall such slope be less than 1½ to 1, depending on the angle of repose of the earth. Such cases shall also be subject to such other requirements as may be deemed necessary by inspection department having jurisdiction.

If tank cannot be set below the level of all piping to which it is connected, satisfactory arrangements shall be provided to prevent syphoning or gravity flow in case of accident to the piping.

Auxiliary supply tanks may be of the gravity or pressure type if suitable automatic safeguards to prevent abnormal discharge of oil at the burner are provided.

If located within a building, gravity tank shall not be within 5 ft. or pressure tank within 10 ft., measured horizontally from any fire or flame.

J. P. Gravity or pressure tank shall be substantially and rigidly installed on incombustible supports in such a manner as to insure protection against mechanical injury.

All piping shall be separated from electric wires not enclosed in approved conduit, raceways and armored cable, by some continuous and firmly fixed non-conductor creating a permanent separation, as provided in the National Electrical Code.

The use of tubing of any kind is prohibited.

I., L. Supply pipe shall be not less than one-fourth inch in diameter iron pipe size, and when oil is pumped to the burner, return pipes shall be at least the same size.

M. Oil pump used in filling auxiliary tank from the main storage tank shall be of approved type, secure against leaks, with check valves located as close to pump as convenient. Pumps shall be rigidly fastened in place.

Automatic pumps not an integral part of the oil burner shall be of an approved type preferably provided with automatic means for preventing continuous discharge of oil in case of pipe breakage.

All connections shall be made perfectly tight with well fitted joints. Unions shall be used at burners to facilitate removal. All unions shall be of approved type, having conically faced joints, obviating the use of packing or gaskets.

Readily accessible valves shall be provided near each burner and also close to the auxiliary tank in the pipe line to burners.

(Continued on Data Sheet No. 48-F)

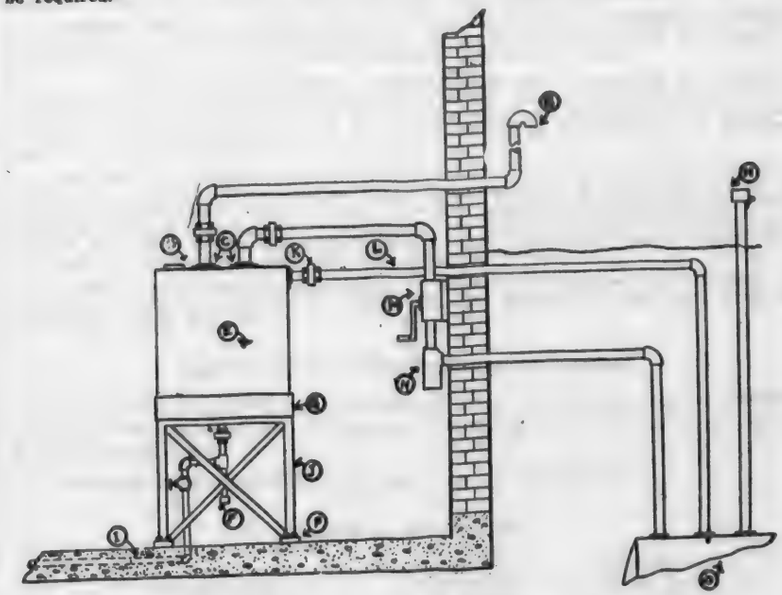
OIL BURNING

Correct Installation of Oil Storage Tanks.

The following notes, referring to the drawing, indicate in detail the correct method of installing tanks for the storage of oil fuel for use in domestic burners.

These notes are based on the new code adopted by the National Fire Protection Association, in May, 1925.

O. Storage tank outside of building, with top below level of burner. Underground tanks shall be thoroughly coated on the outside with tar, asphaltum or other suitable rust resisting material, dependent upon the condition of the soil in which they are placed. Where soil contains corrosive substances, special protection may be required.



Correct Installation of Oil Storage Tank

Inside or above ground and auxiliary tanks shall be coated with a good quality of rust resisting paint; the bottom surfaces preferably being coated with tar or asphaltum or the equivalent.

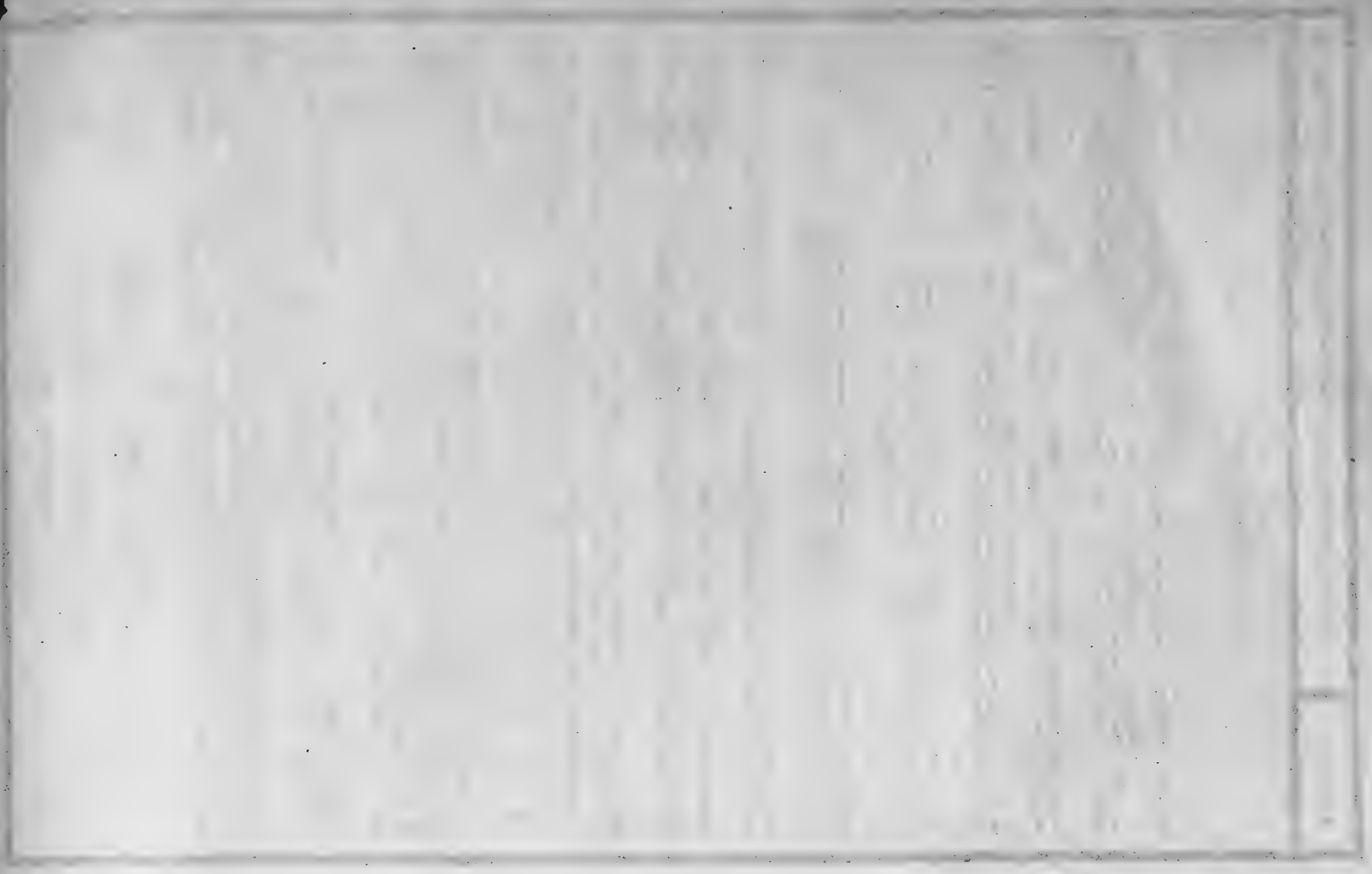
H. Storage tanks shall be filled and vented through standard, approved fill and vent fittings.

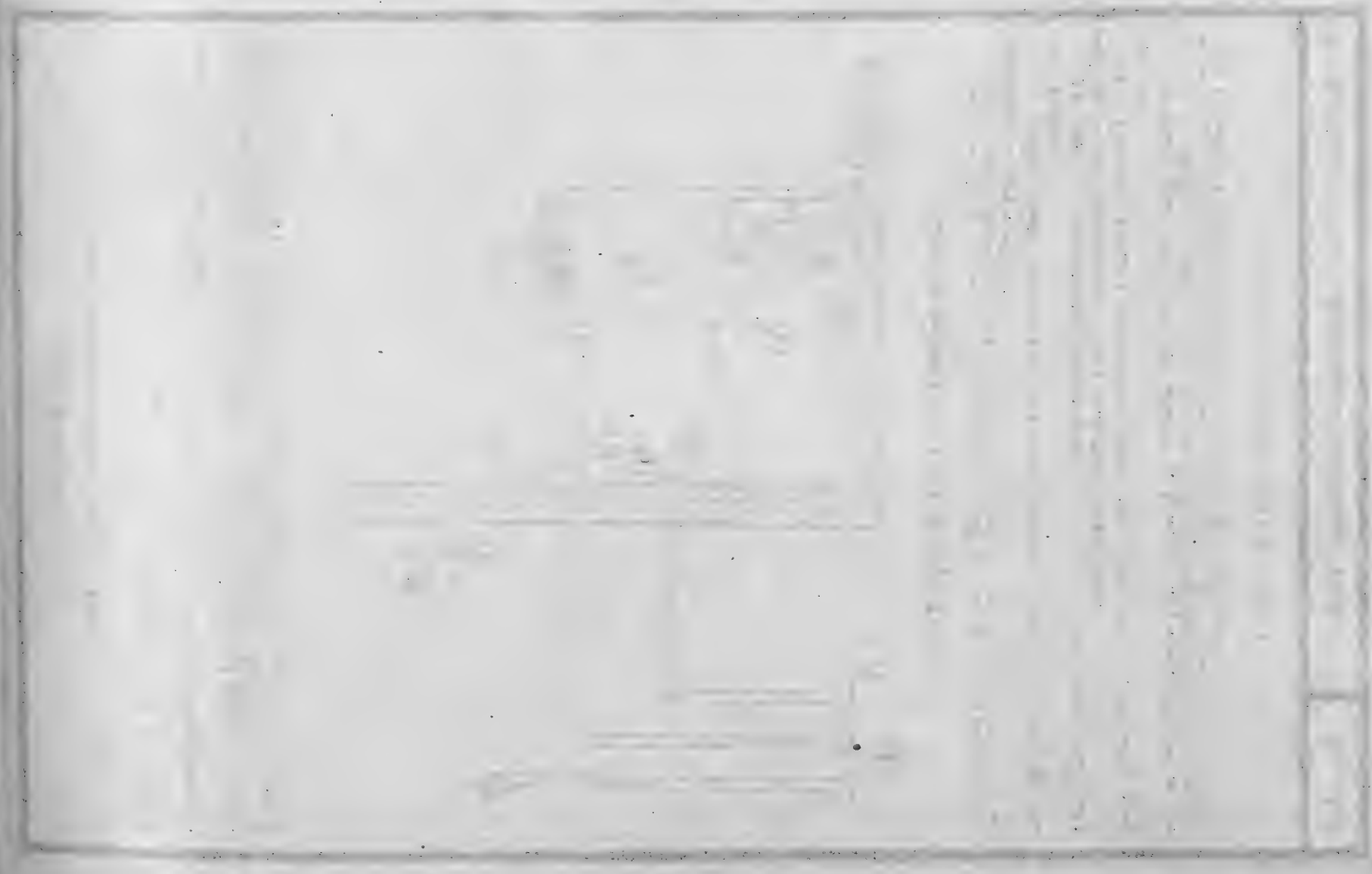
An open or automatically-operated galvanized-iron vent pipe without trap and draining to the underground storage tank shall be provided.

B. Inside or above ground and auxiliary tanks shall be provided with open vent pipe.

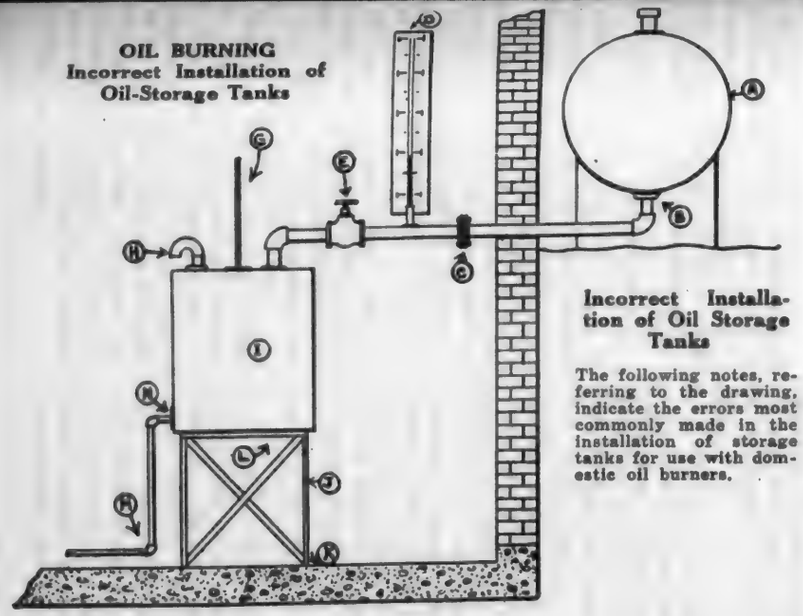
All filling pipes shall terminate outside of buildings and when installed in the vicinity of any door or other building opening shall be as remote therefrom as possible so as to prevent liability of flow of oil or vapor through building openings; terminal shall be provided with a metal cover or cap which may be locked.

(Continued on Data Sheet No. 48-E)





OIL BURNING
Incorrect Installation of Oil-Storage Tanks



Incorrect Installation of Oil Storage Tanks

The following notes, referring to the drawing, indicate the errors most commonly made in the installation of storage tanks for use with domestic oil burners.

A. Storage tank above ground.

B. The pipe line between the storage and auxiliary tanks leading from the bottom of the large container.

In event of a pipe line rupture or leak, the contents of the storage tank will be discharged into the basement, or on to the ground.

C. The use of flange unions with rubber gaskets.

Rubber will in time be rendered useless as a gasket when in contact with the liquid fuel.

D. A glass gauge located in the basement, employed in the line to indicate the oil level of the storage tank.

Breakage of glass gauge will discharge the contents of the storage tank into the furnace room.

E. A shut-off valve without standard packing box.

Valve subject to leaks due to leaking stuffing box, and if left open even slightly will discharge oil into the basement.

F. The impossibility of having an overflow pipe from the auxiliary tank to the storage tank.

No means provided for discharging excess oil to main storage.

G. Ordinary cork float gauge, with stem projecting through top of tank.

In event of filling tank to capacity liquid fuel will be discharged into the room.

H. Auxiliary tank vented inside of basement.

In event of a basement fire oil vapors will increase the hazard.

I. Tank constructed of very thin material, unprotected against corrosion.

Liable to leak.

J. Tank resting on combustible supports.

In event of fire, supports will be consumed and fuel added to the flames.

K. Supports not fixed to floors.

External shocks applied to the tank will strain connections and cause leakage of liquid fuel.

L. No means for cleaning auxiliary tank.

Necessitates dismantling lines, and in all probability re-assembly will not be accomplished in a manner that will insure tightness of joints.

M. Pipe line to burner exposed.

Application of external shocks to small pipe line will likely result in severe strains on connections causing leakage.

N. Pipe connections to the tank secured by soldered flanges.

Flanges which are not riveted as well as soldered are almost certain to fail and permit discharge of oil through the fuel opening into the tank.

OIL BURNING
Correct Installation of Oil-Storage Tanks

(*Concluded from Data Sheet No. 48-E*)

Previous to the installation of the burner, the ash door of the furnace shall be permanently removed, or bottom ventilation otherwise provided to prevent the accumulation of vapors within the ash pit unless burner is of type which mechanically purges ash pit. When ash door is closed it is recommended that other doors of furnace be arranged to swing from the top or be otherwise arranged to relieve pressure sometimes caused by puffs or backfire due to delayed ignition.

Dampers which may entirely close the chimney uptake are prohibited. Damper area should be carefully determined in each case but in no case shall it be greater than 80 per cent of the internal cross sectional area of the uptake.

It is recommended that where automatic operation is provided by means of a room thermostat the installation should be equipped with an additional thermostatic control to prevent abnormal water temperature, abnormal steam pressure or overheated hot air furnace ducts. Such automatic shut-off device should be so arranged that it must be reset manually.

Any woodwork, wooden lath and plaster partition or other combustible material within 4 ft. of the sides or back or 8 feet from the front of the furnace shall be covered with approved plaster board or other approved incombustible material. Above the furnace there shall be constructed a ceiling consisting of plaster board covered with sheet metal, or cement plaster on metal lath; said ceiling shall extend 4 ft. beyond the sides and back and 8 ft. from the front.

A card giving complete instructions in regard to the care and operation of the system shall be permanently posted near the apparatus. Said card shall be placed under glass and framed.

MATERIAL AND CONSTRUCTION OF TANKS

Tanks shall be constructed of galvanized steel, open hearth steel or wrought iron of a minimum gage (U. S. Standard) depending upon the capacity as given in the following Table.

For liquids heavier than 35° A.P.I. tanks may be of concrete.

MATERIAL FOR TANKS

Capacity (gal.)	Minimum Thickness of Material	Pounds per Square Foot
1 to 285	16 gauge	2.50
286 to 560	14 gauge	3.125
561 to 1,100	12 gauge	4.375
1,101 to 4,000	7 gauge	7.50
4,001 to 12,000	1/4 inch	10.00
12,001 to 20,000	5/16 inch	12.50
20,001 to 30,000	3/8 inch	15.00

For tanks of 1,100 gal. and more, a tolerance of 10% in capacity may be allowed. Tanks of open-hearth steel or wrought-iron thinner than No. 7 gauge shall be galvanized. If adequate internal bracing is provided, tanks from 12,001 to 30,000 gal. capacity may be built of ¼ in. plate.

All joints shall be riveted and caulked, brazed, welded or made tight by some equally satisfactory process. Tanks shall be tight and sufficiently strong to bear without injury the most severe strains to which they may be subjected in practice. Shells of tanks shall be properly reinforced where connections are made, and all connections made through the top of tank above the liquid level.

Wisconsin's Revised Heating and Ventilation Code

Full Text of the Latest State Law Covering Standards for Heating and Ventilation of Public Buildings and Places of Employment

(Adopted April 8, 1925)

(Continued from June issue.)

SECTION 4. GENERAL REQUIREMENTS FOR CLASSIFIED OCCUPANCIES AND AREAS

Order 5840—Places of Assembly With Seats.

1. Scope. This classification shall be understood to include theatres, picture theatres, school auditoriums (not classrooms), public lecture halls, and similar close-seated areas usually provided with seats, whether seats are used or not.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class having a seating capacity of 50 or more.

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class shall be not less than 3 cu. ft. per minute per square foot of floor area between main walls, not including the stage but including the gross floor area of balconies and galleries. The stage shall be supplied with sufficient air to equalize the air pressure thereat so as to avoid deflecting the curtain, but this volume of air need not be in addition to the volume calculated for the auditorium.

The air supply for foyers and lobbies used in conjunction with occupied areas of this class, shall be not less than 2 cu. ft. per minute per square foot of floor area.

4. Inlet Air Currents. In areas used for fixed occupancy, the inlets shall be so located, arranged or equipped as to prevent direct inlet air currents from striking the backs of the occupants.

Order 5841—Motion Picture Booths.

1. Scope. This classification shall be understood to include all motion picture booths other than portable booths.

2. Exhaust Ventilation Required. Exhaust ventilation shall be provided and maintained for every occupied area of this class, and such exhaust ventilation shall be independent of the auditorium ventilation system.

3. Minimum Air Movement. The air movement provided and maintained in occupied areas of this class shall be not less than 1½ cu. ft. per minute per square foot of floor area in booth.

4. Minimum Size of Gravity Outlet Ducts. The effective area of gravity outlet ducts serving occupied areas of this class shall be not less than equivalent to 12 in. inside diameter, for each picture machine, unless adequate approved mechanical exhaust is provided; and all such ducts shall extend directly to the outside of building.

5. Mechanical Exhaust Systems Independent. Mechanical exhaust systems provided for occupied areas of this class shall be independent of all other ventilation systems in the building.

Order 5842—Places of Assembly Without Seats.

1. Scope. This classification shall be understood to include lodge rooms, dance halls, dining and banquet rooms, skating rinks, gymnasiums, playrooms and similar areas not normally provided with seats.

2. Ventilation Required. Ventilation shall be provided and maintained for occupied areas of this class wherever such occupied areas are in, or are used in connection with, school or college buildings, and in all other cases where the total window sash area is less than 10% and the total of out-door opening therethrough is less than 5% of the floor area, respectively.

NOTE: Where ventilation is not required, because of excess window area and out-door openings, such window area and out-door openings should preferably all be above grade. No window or out-door opening below grade will be counted unless there is a clear space outside of the windows, having width of not less than 1½ times the distance below grade at the bottom of the window.

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class shall be not less than 1½ cu. ft. per minute per square foot of the floor area served.

4. Dining Room Ventilation. Where dining rooms and similar occupied areas are used in conjunction with adjacent or near-by kitchens or other sources of objectionable odors, the spread of such odors throughout the dining rooms shall be prevented by appropriate exhaust of a portion of the dining room air through the kitchens or other sources of odors.

Order 5843—Kitchens.

1. Scope. This classification shall be understood to include all occupied areas housing the preparation of food, or other culinary operations, in all buildings within the scope of this code, except areas classified under Order 5846.

2. Exhaust Ventilation Required. Exhaust ventilation shall be provided and maintained for every occupied area of this class having a floor area of more than 100 sq. ft.

3. Minimum Air Movement. The air movement provided and maintained for areas of this class, wherein exhaust ventilation is required, shall be not less than:

(A) 2 cu. ft. per minute per square foot of floor area for kitchens used intermittently;

(B) 4 cu. ft. per minute per square foot of floor area for all commercial kitchens.

4. Exhaust Systems Separate. Exhaust systems serving areas of this class shall be kept separate from, and independent of, all other services and systems in the building; except in places of industrial employment.

5. Kitchens Adjacent to Dining Rooms. Where areas of this class are located adjacent to dining rooms and similar areas, not less than one half of the air exhausted shall be drawn from the dining room in order to prevent spread of odors.

Order 5844—Places of Assembly for Worship.

1. Scope. This classification shall be understood to mean and include only those auditoriums, social assembly rooms, Sunday School rooms, and similar areas, which are contained in churches or houses of worship.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class where the total window sash area is less than 10% of the floor area served and the total out-door openings therethrough is less than 2% of floor area.

(See note under Order No. 5842.)

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class shall be not less than 1 cu. ft. per minute per square foot of floor area.

NOTE: This means not less than 1 C.F.M. per square foot total occupied floor area, including basement, first floor, balconies, and auxiliary rooms and areas.

4. Alternate Service. All heating and all ventilation systems installed in occupied areas of this class shall be arranged for selective delivery of entire service to either the auditorium floor areas or to the basement floor areas; unless the air supplied thereby is more than 1½ cu. ft. per minute per square

foot of the greater of the two floor areas.

5. Alternate Capacity. Where heating or ventilation systems serve auditorium and basement floor areas in this class, the capacity of such system may be based upon alternate service to auditorium floor areas alone, when the air supply furnished there to exceeds 1½ cu. ft. per minute per square foot of floor area.

Order 5845—Schoolrooms.

1. Scope. This classification shall be understood to include class, recitation, study, and library rooms, in all school and college buildings, and similar areas used for educational purposes.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class, except those which are used for open air or out-door treatment.

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class where ventilation is required, shall be not less than 2 cu. ft. per minute per square foot of floor area. The air supply for corridors and halls used in conjunction with occupied areas of this class shall be not less than ½ cu. ft. per minute per square foot of floor area.

4. Alternate Service and Capacity. The capacity of heating systems and of ventilation systems installed in school buildings having not more than two classrooms, may be based upon service to classroom floors only; provided that where basement apparatus is used, appropriate arrangement shall be made for alternate service to basement areas if used for occupancy. In school buildings having more than two classrooms the capacity of heating and ventilation systems shall be based upon simultaneous service throughout, except that where an auditorium is used for public assemblage the additional ventilation required because of such use may be secured by alternate service.

5. Humidity Required. All air used for ventilation purposes in school buildings shall be appropriately humidified.

Order 5846—Places of Vocational Instruction and Research.

1. Scope. This classification shall be understood to include all places of vocational instruction and research, such as laboratories, school shops, domestic science rooms and similar occupied areas.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class where the available floor space is less than 50 sq. ft. per normal occupant or where heat, smoke, gas, dust, spray, fumes, vapor, steam, foul air, or other contamination would otherwise be present in the air in sufficient quantities to obstruct the vision or to be irritating or to be injurious to the health, safety or welfare of employes and frequenters.

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class shall be not less than an amount sufficient to make up for contamination of air due to the nature of the work being carried on, plus 2 cu. ft. per minute per square foot of floor area.

Order 5847—Wardrobes and Locker Rooms.

1. Scope. This classification shall be understood to include all wardrobes and locker rooms and similar rooms in all buildings within the scope of this code.

2. Ventilation Required. Ventilation shall be provided and maintained for all areas of this class. Wherever practicable, such ventilation shall be accomplished by exhaust methods, and in any case the effectiveness of the outlets shall be greater than that of the inlets.

3. Minimum Air Movement. The air movement provided and maintained for areas of this class, shall be not less than 2 cu. ft. per minute per square foot of floor area.

4. Combination Rooms. Air movement of not less than 5 cu. ft. per minute per locker or individual hanger space, in addition to the air supply required for use as halls or corridors, shall be provided and maintained for all halls and corridors containing lockers for clothing, or which are used as wardrobes or cloakrooms. Inlets and outlets shall be provided and maintained for such areas, and the effectiveness of the outlets shall be greater than that of the inlets.

5. Wardrobes and Cloakrooms in School Buildings. Where necessary in order to insure practical results in wardrobes or cloakrooms adjacent to or within occupied areas covered by order 5845, the required ventilation shall be accomplished by use of inlets admitting air from adjacent classrooms or corridors, or similar areas, in conjunction with outlets and ducts discharging direct to outside atmosphere. The movement of air in such areas shall be such as to promote thorough aeration of clothing therein.

Order 5848—Toilet, Bath and Swimming Rooms.

1. Scope. This classification shall be understood to include all toilet, bath, and swimming-pool rooms, and other similar occupied areas, in all buildings within the scope of this code.

2. Ventilation Required. Ventilation shall be provided and maintained for all areas of this class. Wherever practicable, such ventilation shall be accomplished by exhaust methods, and in any case the effectiveness of the outlets shall be greater than that of the inlets.

NOTE: Conditions in this class of areas are such that sometimes floor-line vent openings are necessary, and at other times the outlet should be at the ceiling. Therefore both floor-line and ceiling-line outlets should be provided, and they should be equipped with operative louvre dampers, interlocked, so only the floor-line or ceiling-line outlet is open at one time.

3. Minimum Air Movement. The air movement provided and maintained in occupied areas of this class shall be not less than 2 cu. ft. per minute per square foot of floor area.

4. Exhaust Systems Separate. Exhaust systems serving this class of occupied areas shall be kept separate from, and independent of, all other services and systems in the building except in places of industrial employment.

Order 5849—Private Rooms.

1. Scope. This classification shall be understood to include private rooms, such as offices, bedrooms and similar areas, other than in penal institutions.

2. Window Ventilation Permissible. Window ventilation shall be considered permissible for occupied areas of this class.

Order 5850—General Offices.

1. Scope. This classification shall be understood to include all offices and similar occupied areas, other than those included in order 5849, wherein the air conditions and nature of occupancy do not involve reasonable inclusion in any other classification in this code.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class:

(A) Where the total window sash area is less than 6% of the floor area, or the total areas of out-door opening is less than 3% of floor area; or

(B) where the available floor area is less than 50 sq. ft. for each normal occupant; or

(C) where heat or odors would otherwise be present in sufficient quantities to be injurious to the health, safety or welfare of the employes and frequenters affected.

3. Minimum Air Supply. Where ventilation is required, the minimum air supply for occupied areas of this class shall be not less than ½ cu. ft. per minute per square foot of floor area.

Order 5851—Salesrooms.

1. Scope. This classification shall be understood to include all salesrooms and other occupied areas of similar character.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class unless the aggregate of out-door openings is more than 3% of the floor area, provided such out-door openings are arranged so as to cause air circulation throughout the respective rooms.

3. Minimum Air Supply. Where ventilation is required, the air supply provided and maintained for occupied areas of this class shall be not less than 1 cu. ft. per minute per square foot of floor area on the first floor, with a cumulative decrease of 10% for each floor above the first floor and a cumulative increase of 10% for each floor below the first floor.

Order 5852—Garages.

1. Scope. This classification shall be understood to include all public garages, and all employment areas in any building housing three or more motor-driven vehicles.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas in this class.

3. Minimum Air Supply. Where the ventilation is secured by the displacement of contaminating gases the air supply provided and maintained for occupied areas of this class shall be not less than 1½ cu. ft. per minute per square foot of live storage area, and 3 cu. ft. per minute per square foot of repair area.

Where ventilation is secured by dilution of the contaminating gases the air supply provided and maintained for occupied areas of this class shall be not less than 15 cu. ft. per minute per square foot of live storage area and 30 cu. ft. per minute per square foot of repair area.

In buildings, or rooms isolated from the rest of the building in an approved manner, where accessories are applied, upholstering done, or similar work not involving engines is carried on, the air supply provided and maintained shall be not less than 0.75 cu. ft. per minute per square foot of floor area.

4. General Requirements. The products of combustion, and vapors or gases from fuel or batteries, shall be removed promptly and effectively from the breathing zone of employees and frequenters; and there shall be at all times not less than 2500 cu. ft. of fresh air for each cubic foot of carbon monoxide in such breathing zones.

NOTE: For ventilation where spray coating is done, see General Orders on spray coating issued by the Industrial Commission.

Order 5853—Places of Employment.

1. Scope. This classification shall be understood to include all places of employment not classified elsewhere in this code.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class:

(A) Where the available floor space is less than 75 sq. ft. per normal occupant; or

(B) where heat, smoke, gas, dust, spray, fumes, vapor, steam, foul air, or other contamination would otherwise be present in the air in sufficient quantities to obstruct the vision, or to be irritating, or to be injurious to the health, safety or welfare of employees and frequenters; or

(C) where industrial poisons are to be used, stored, or handled, or would otherwise be present in the breathing zone.

3. Minimum Air Supply. The air supply provided and maintained for occupied areas of this class shall be not less than an amount sufficient to make up for contamination of air due to the nature of the work being carried on, plus 1 cu. ft. per minute per square foot of floor area; but in no case shall the air supply be less than 30 cu. ft. per minute per normal occupant.

4. Exhaust Systems Required. Exhaust systems shall be provided and operated at all sources of air-contamination in occupied areas of this class, unless the air which any employee or frequenter must breathe is otherwise kept pure, fresh and clean.

(See note under Order No. 5852.)

Order 5854—Dormitories and Wards.

1. Scope. This classification shall be understood to include rooms equipped with more than two beds.

2. Window Ventilation. Window ventilation may be relied upon for occupied areas of this class, wherein the available window sash area is more than 10% of the floor area and the out-door opening therethrough is more than 5% of floor area.

(See note under Order No. 5842.)

Order 5855—Penal Institutions.

1. Scope. This classification shall be understood to mean and include areas of compulsory occupancy in penal institutions, such as cells and corridors and similar areas.

2. Ventilation Required. Ventilation shall be provided and maintained for all occupied areas of this class.

3. Minimum Air Supply, Mechanical Ventilation. Where mechanical ventilation is required for occupied areas of this class, the air supply shall be not less than ½ cu. ft. per minute per square foot of cell area served.

4. Gravity Ventilation Permitted. Gravity ventilation wherein direct gravity inlets and direct gravity outlets and ducts are used, shall be considered permissible for occupied areas of this class where each cell or individual part of a cell comprises more than 100 sq. ft. of floor area, or there is a total direct out-door opening area equal to not less than 10% of the floor area.

5. Mechanical Ventilation Required. Mechanical ventilation shall be provided and maintained for all occupied areas of this class having less than 100 sq. ft. of floor area, or total direct out-door opening area equal to less than 10% of the floor area, for each cell or individual part of a cell.

(*To be concluded in August.*)

National Trade Extension Bureau

Summer Care of Heating Apparatus

IN a message to householders, issued by the National Trade Extension Bureau, instructions for overhauling the heating plant are offered, with the suggestion that they be made the subject of local advertising in newspapers and otherwise.

Among the specific suggestions are the following:

1. Drain boilers and wash out all sediment and refill immediately with fresh water up to proper heating level.

2. Take down smoke pipe to chimney and clean out thoroughly. Examine condition of all dampers and oil all working parts to prevent rusting.

3. Have chimney cleared of all soot and dirt and carefully examined as to flue linings and any needed repairs. Replace smoke pipe carefully and securely.

4. On a steam or hot water plant, any automatic controlling devices, water feed, etc., including all piping connections, should be carefully examined and cleaned; and all metal working parts properly adjusted and lubricated.

5. Examine all stuffing boxes on all valves and repack if necessary. Examine and adjust air valves. See that blow-off cock is securely tight.

6. Build fire, test out every part of the equipment under working conditions.

7. Entirely remove all ashes, dust and soot from inside and outside of boiler, including flues, tubes and smoke passages; also ash-pit and fire-box.

8. Fill fire-box heaping full with fresh lump lime to absorb moisture and retard rusting.

9. Go over all doors, frames and other exposed iron work with an oily rag. Oil all hinges and leave all doors standing wide open.

10. Consider carefully the economy of boiler sheathing and pipe covering to prevent wasteful losses of heat. Consider also the heating economy of weather-stripping doors and windows and calking frames.

11. Finally, be careful to not overlook any fire hazards. Be sure that anything that will burn is properly protected by insulation.

Making Boilers Scavenge Their Own Dust and Gases

AN interesting solution of a common difficulty was effected by H. C. Russell, inspection engineer in the Office of Supervising Architect, U. S. Treasury Department, when he made the draft fans of a pair of boilers feed back to them the dust and gas thrown out at the cleaning periods, which had caused considerable trouble in the buildings.

In describing this experience, Mr. Russell writes:

"In one of the larger post-office buildings, which has its own generator plant and boiler plant installed in the basement, the nuisance from the dust and gases let loose in the basement during the cleaning of the fires became a serious matter.

"The boiler plant consisted of two longitudinal-drum, high-pressure, water-tube boilers of about 200 H.P. each, rating. The plant was equipped with a well-known make of underfeed stokers, so designed that when the fires were cleaned, which was some four or five times a day, the clinkers, etc., had to be raked out of the furnaces onto the firing floor, in front of the boilers. An engine-driven forced-draft fan was provided for each boiler, with discharge ducts so arranged that either fan could be used for either boiler or for both boilers. The floor-to-ceiling height of the basement was about 12 ft., and to get the necessary height for the boilers and furnaces, the boilers and stokers were set in a pit about 6 ft. deep. The boiler plant was in operation throughout the year, with one boiler in service and one boiler idle at all times.

"It was noted that, quite naturally, the dust and hot gases from the clinker and ash drawn from the furnaces when they were cleaned, arose immediately to the ceiling, and, finding their way along the ceiling, permeated nearly the entire building in spite of all reasonable efforts to prevent it. Doubtless some of these gases were heavier than air and, upon cooling, fell to the basement floor, but not to an objectionable degree.

CURTAIN WALL USED TO ENCLOSE AREA OVER FIRING PIT

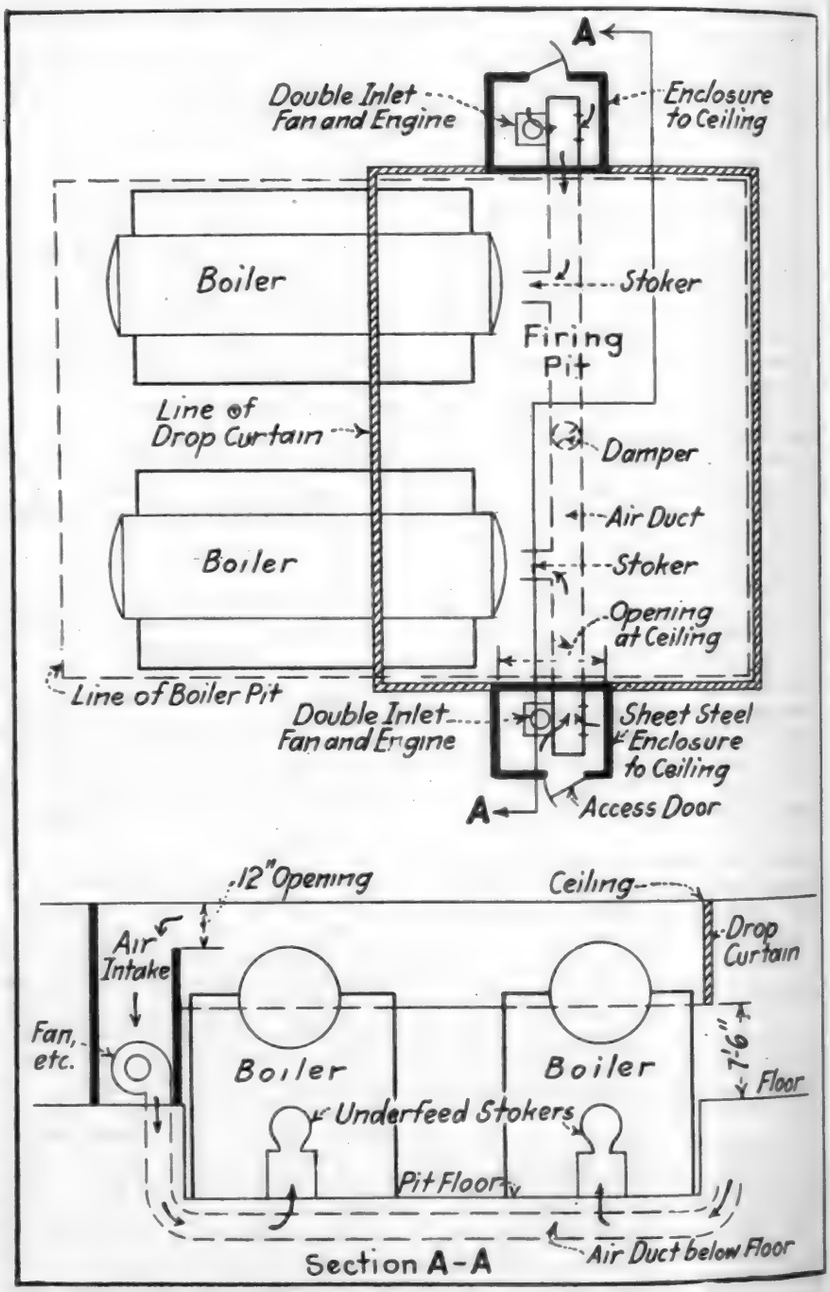
"It occurred to me to make these furnaces 'eat their own smoke.' Enclosing the area of the ceiling over the firing pit, and extending a few feet back of the boiler fronts, a curtain wall was dropped from the ceiling down to about 7 ft. 6 in. above the basement floor, forming a sort of a box placed upside down, and this was made as tight as practicable at the ceiling, particularly where pipes ran through the ceiling and walls. The two double-inlet fans, which formerly took their air near the floor line, were housed in so as to take air from within the box near the ceiling.

"The capacity of these fans was about 4000 c.f.m. at normal speed. One of them was always in operation at some speed between half normal and normal, as required to maintain pressure in the boilers. Except in rare instances the other fan (on the idle boiler) could be operated at any desired speed. The breechings, etc., were large enough for both fans to operate at full speed. At the time of cleaning the fires, the pressure on the boiler under steam had a tendency to drop, which caused the fan on this boiler to speed up, thus automatically aiding our ventilation scheme.

"The contents of the inverted box, or hood, were about 4000 cu. ft. The fan on the boiler under steam in normal operation, handling from 2000 to 4000 c.f.m., according to the speed, gave a full change of the air in the box in one to two minutes. The fan on the idle boiler when started could handle about 6000 c.f.m. at normal speed, due to the absence of the fire, reducing friction. The maximum air change obtainable was therefore 8000-10000 c.f.m.

"I have been advised that this arrangement has given perfect satisfaction and that it has never been necessary to operate the fan on the idle boiler to assist in the air removal; the 2000-4000 c.f.m. drawn by the fan on the boiler under steam being sufficient to remove the objectionable gases before they had time to get into the basement or out of the box.

"It was first thought that it might be necessary to run some pipes across the ceiling above the firing pit to obtain



Method of Enclosing Firing Pit to Eliminate Dust and Gases

better collection of the air in the box, but it was found that one opening near the ceiling for each fan was ample.

"The curtain was made of asbestos plaster on expanded metal and was made as tight as practicable around the pipes near the ceiling, with sheet-iron sleeves closely fitted around pipes and covering. The housing chambers around the fans and engines were of sheet steel.

"It will be noted that there is no operating expense in connection with this system, the fans being operated exactly as before its installation. The only expense was the first cost of the drop curtain and the enclosures for the fans and engines."

Correspondence

Open-Tank Versus Closed-Tank Heating Systems

EDITOR HEATING AND VENTILATING MAGAZINE:

I have a job to heat a 3-car garage, also two 1-car garages adjoining same. The owner wants a water heating system installed. The 3-car garage is brick, the other two are frame, small private garages, cement floor, one-story high.

The owner wants wall radiators about 3½ ft. above floor. The ceiling and side walls have plaster board. The heating boiler will set in separate building or shed near center. Main to run overhead and return underground.

Would you advise a closed system such as the Mueller Company puts out or an open-tank system?

The expansion of water is an irresistible force—not to be confined without disastrous results and, for this reason, any mechanical device, such as a relief valve, which might sometime be inoperative, was for some time looked upon with disfavor. But such devices have been improved with time and the one mentioned has been approved by cities such as Seattle, Philadelphia, Harrisburg, Scranton, Atlantic City, Indianapolis, Baltimore and Tulsa, Okla. Recently it has been presented for approval by the A.S.M.E. At least one point of importance should be kept in mind, which is that even in an open system there is the possibility of the overflow or tank connections becoming stopped up from corrosion or freezing, in which event the open system would be more dangerous than any closed system. It is because of this possibility that expansion tanks are sometimes provided with circulating connections.

Minor items which might enter into this discussion, matters which are more a matter of debate than they are of practical importance are the slight loss of water and the heat it contains from the particular closed system in mind. Then there is the possibility of more corrosion in the pipes due to the make-up water required, just as domestic hot water service systems are subject to greater corrosion than water heating systems in which the air is gradually eliminated and the water seldom renewed. However, this disadvantage of water and heat wastage and corrosion is also possible in an open system, especially where the expansion tank is installed only a few feet above the highest radiator. In such cases expansion frequently results in boiling, causing overflow and air to be drawn back into the system as the water contracts below the highest radiator connections. Open tanks are also subject to evaporation of the water.

In the closed system referred to by the correspondent, the relief valve operates often enough to keep it from sticking, say one or two workings per day, and the small amount of water discharged is automatically made up through a reducing valve as soon as the pressure lowers to the point at which this valve is set. Both valves are made of non-corrosive materials, have strainer protection and diaphragms of large area. An additional feature of safety is a sensitive damper regulator which operates not only to produce economy, but also to prevent dangerously high water temperatures.

Among the advantages of the system are automatic operation as to make-up, pressure relief and damper regulation thereby eliminating any necessity for occasional manual control in the basement. Fuel can be saved because of this automatic regulation and also because of the greater temperature range possible in accordance with the heating demand. Room thermostat with temperature control can also be used. Circulation is increased and pipes may be used of slightly smaller size. Furthermore, it would seem that less radiating surface would be required, because of the higher water temperatures, but for some reason this is not recommended by the manufacturer.

As a matter of installation, the closed system avoids the unsightly appearance of the open expansion tank, together with the space required for this tank, which space cannot always be obtained. Possible damage from an overflowing expansion tank is also avoided.

Simple Method of Computing Roof Losses

EDITOR HEATING AND VENTILATING MAGAZINE:

From time to time I see discussions of various methods of determining heat loss through ceilings and roofs, most of them depending upon some assumption which may be right or wrong. For instance, on Page 68 of your March, 1925 issue is such a discussion which seems to assume that the roof area and ceiling area is always the same. In most cases the ceiling and roof exposure is so small a part of the total exposure that an intelligent "guess" can be made without serious effect.

However, that is not always the case. In many buildings of factory and warehouse type the roof and ceiling loss is quite a sizable per cent of the total and should be figured quite as accurately as that of the walls and glass. For a number of years on work of this kind I have used a very simple and rational method of figuring these losses. I have never seen this method or anything like it advanced by any one although it is so simple that it would seem to have occurred to many engineers.

It consists simply in estimating the temperature of the attic or roof space from the known structural conditions and the assumed outside and inside temperatures.

T_i = Inside room temperature (known)
T_o = Outside air temperature (known)
T_x = Temperature of attic or roof space (unknown)
S_c = Ceiling area in square feet (known)
S_r = Roof area in square feet (known)
S_w = Wall area between roof and ceiling (known)
K_c = B.T.U. per hr. per sq. ft. per degree difference ceiling (known)
K_r = B.T.U. per hr. per sq. ft. per degree difference roof (known)
K_w = B.T.U. per hr. per sq. ft. per degree difference wall (known)

Since the heat which is transmitted through the ceiling is equal to that transmitted through the roof, plus that through the wall between the ceiling and roof, the following equation is evident:

$$S_cK_c(T_i-T_x)=S_r(K_r)\ (T_x-T_o)+S_w(K_w)(T_x-T_o).$$

Solving for T_x, the required temperature of attic or roof space we have:

$$T_x=\frac{T_o(S_rK_r+S_wK_w)+S_cK_cT_i}{S_cK_c+S_rK_r+S_wK_w}$$

The formula was given in the above manner in order to show its rational derivation. In actual application it can be used in the following manner which is somewhat simpler:

A = B.T.U. transmission per hour from room to attic *per degree difference room temperature and attic temperature* = $S_c \times K_c$ in above formula.

B = B.T.U. transmission per hour from attic to outside *per degree difference attic temperature and outside temperature* = $(S_r \times K_r)+(S_w \times K_w)$

Then with T_x, T_o, and T_i the same as in above formula we get:

$A(T_i-T_x)=B(T_x-T_o)$, therefore

$$T_x=\frac{BT_o+AT_i}{A+B}$$

For example, if there is 1000 sq. ft. ceiling with a coefficient of 0.70; 1100 sq. ft. roof with coefficient of 0.50 and 200 sq. ft. wall exposed from attic to outside with coefficient of 0.40, with an inside temperature of 70° and an outside temperature of 10° we get:

$A = 1000 \times 0.70 = 700$ B.T.U. per hour per degree difference.

$B = 1100 \times 0.50 + 200 \times 0.40 = 630$ B.T.U. per sq. ft. per degree difference; and

$$T_x = \frac{BT_o + AT_i}{A+B} = \frac{(630 \times -10) + 700 \times 70)}{700+630}$$

$= 32°$.

The temperature of the roof or attic space then being 32°, the heat loss may be figured by using the ceiling area and its coefficient, with a temperature difference from 70° to 32°, or, by taking the heat loss through the roof and the walls between ceiling and roof to outside, using temperature difference of 32° and — 10°. It will be the same either way. Note that where minus temperatures are used the product must be subtracted; the 6300 in the above case was subtracted from the 49000.

It is evident that the S and K factors in the above equations can be extended indefinitely to care for monitors, skylights, ceiling lights, etc. The method can also be used to figure heat losses through walls, etc., where heated rooms are exposed to heated rooms.

In many cases, of course, the usual "rule of thumb" will suffice to figure ceiling losses, but, in many cases, where the ceiling exposure is unusually large, compared to wall, glass, etc., the "thumb" rules may lead to serious errors.

Chattanooga, Tenn. H. C. RUSSELL.

A One-Pipe System with a Cold Point

EDITOR HEATING AND VENTILATING MAGAZINE:

I enclose herewith a rough sketch of part of a heating system installed in a residence. One circuit does not seem to be getting away properly, therefore one of the radiators on the same is quite cold—the one so noted on the sketch. Where the ¾-in. pipe drops it gets very hot and also the first radiator it supplies, but from there, as noted, it does not get very warm or supply any heat to the radiator.

There are fifteen radiators on the job and each heats up satisfactorily except the one referred to. The sketch shows the run of the piping in the roof space above, which piping supplies the circuit.

I would like to know what you think about the matter. It is quite likely that the trouble will be overcome by the time I get your reply, nevertheless I would like to know where the fault lies.

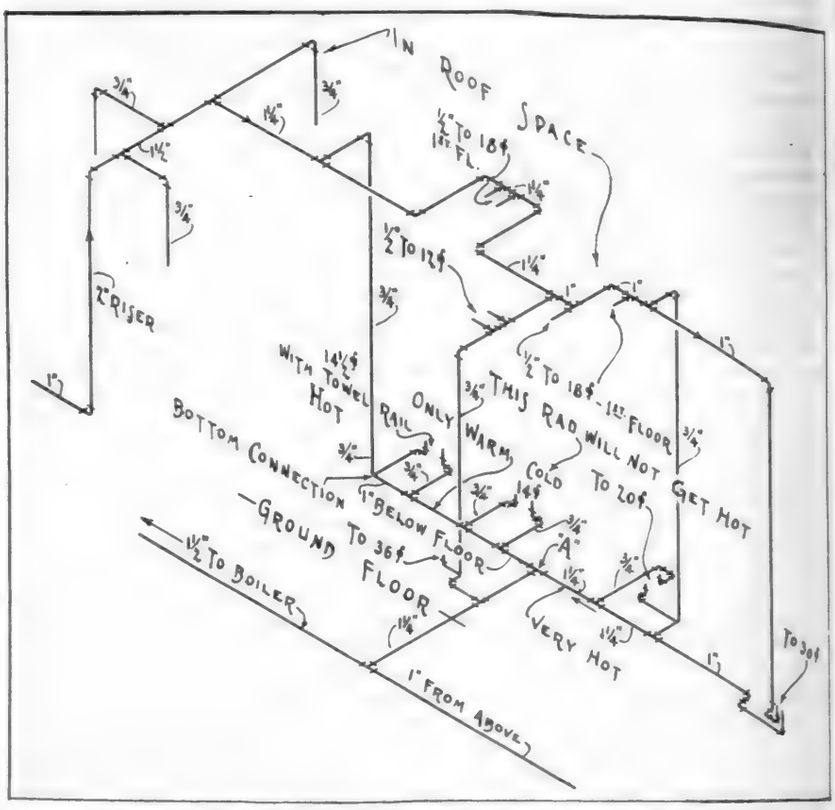
Scotland. J. H. S.

Many queries of this nature are received which would doubtless be of considerable interest to our readers were the information more detailed. The precise nature or kind of heating system is not stated. Furthermore, the sketch submitted and redrawn as shown, according to our interpretations, is so general in its nature that it is quite difficult to attempt any positive solution of the problem.

Many things are possible in the actual installation which do not show in the piping diagram. It is, of course, self-evident in the question under consideration that the trouble is at the cold point as the water is hot each side of this point. Some of the possible causes of the difficulty would be stoppages in the pipes (especially in the very small sizes such as shown), pockets in the pipes, too long a run of too small a supply pipe, as seems probable in this case, lack of reaming, causing a high resistance to the flow at this point, pipes incorrectly pitched or not at all, runouts connected from top or bottom of mains contrary to requirements of the case, or else a bull-head tee at point "A," causing a flow in opposition with the stronger prevailing.

The one thing that seems to offer the best solution of the problem is the depression in the hot water supply pipe caused by this pipe dropping from the roof space to below the floor from which it rises by way of a runout to the radiator above. The resulting depression does not allow of venting the high points of the radiators, that is, assuming there are no air valves on the radiators—it being customary to omit these in down-feed water heating systems.

In matters of this kind it is usually best to eliminate theorizing and guessing. It is better to visit the installation, going directly to the troublesome point and there feeling for the coldest spot, disconnect the piping at this point. Usually the trouble will be found in the installation rather than in the design.



Down-Feed One-Pipe System with a Troublesome Cold Point

How To Make Tight Pipe Joints

A heating contractor recently informed the Bureau of Standards that he had found lead fillings taken from an ordinary lead pipe by a coarse rasp, and sprinkled onto the threads of a pipe joint (being held on, while screwing up the joint, by the cutting oil used or by the ordinary white or red lead joint paste), to give a tighter joint than the paste. The lead alone without any paste was said to be satisfactory, and such joints were said not to stick and be difficult to unscrew as is the case with old joints on which the paste has been used.

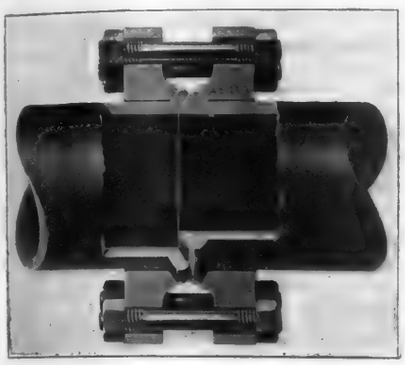
In the *Technical News Bulletin* issued by the Bureau of Standards, tests made by the bureau on this method are described. It was found that half the joints made with white lead paste leaked; one of the joints made with paste and lead filings leaked; but not one of the joints made with lead filings alone leaked when subjected to a pressure of 8500 lbs. per square inch.

The lead joints all unscrewed readily and it is obvious that this condition would not change with time to any such degree as will that of a paste joint.

New Apparatus and Appliances

Midwest Joints Eliminate Gaskets

A novel form of connection of pipe-to-pipe and of pipe-to-fittings has been developed by the Midwest Piping & Supply Co., St. Louis, Mo., and is designated as Midwest joints. Special machinery and tools developed for the purpose, roll the heated ends of pipe into dies,



Pipe-to-Pipe Joint Which Eliminates Gaskets

forming flanges on the pipe with minimum thickness in excess of that of the pipe itself. The rolled flanges are then machined by special tools so that true spherical surfaces result, both on the outside of the flange, and the inner end of the pipe. To make a joint, two ends, male and female, are brought together and clamped between bolting flanges, the inner surfaces of which are machined to the same radius as that of the pipe flange outer surfaces. In the case of fittings and valves, the bolting flange is integral with the fitting or valve. A tight joint is assured through the accuracy and degree of machining, and pipe line deflections of 5° are possible without strain on the pipe or flanges. Laboratory tests are quoted to show that the specially-rolled end section of the pipe is stronger that the original pipe. The Midwest joint is made in sizes from 1½ in. to 24 in. diameter for any practical high pressure and temperature.

New Reducing Valve Has Interesting Features

The Donnelly reducing valve, just been placed upon the market, is notable for its simple design and workmanlike make-up. This reducing valve is designed accurately to supply steam under both pressure and quantity control, to heating systems. It consists of a chamber provided with a special throttling valve on the inlet, a calibrated delivery nozzle on the outlet, and a high-pressure gauge for indicating the pressure on the control chamber. The nozzle is calibrated for the supply pressure, usually 35 lbs., and the delivery pressure and quantity are obtained by adjusting the nozzle pressure to this amount. It is listed in sizes providing for radiation from 300 sq. ft. to 37,000 sq. ft. It is manufactured by Donnelly Systems Company, New York.

Novel Method for Demonstrating Mercoid Controls

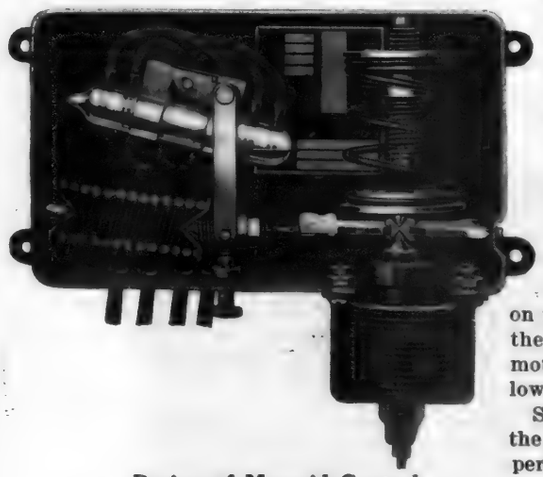
A novel and interesting means for showing the many various applications of the Mercoid controls was shown recently at the meeting of the Buffalo chapter, of the American Society of Heating and Ventilating Engineers. This working exhibit makes it possible to demonstrate clearly the operation of these temperature, pressure, and vacuum controls for highly diversified uses, such as oil burning, refrigeration, central heating, tank water control, dry kiln control, and many other applications.

Mercoid controls operate by electricity, using the well-known Mercoid switch, consisting of a sealed glass tube containing mercury which makes or breaks contact, by flowing across special terminals sealed within, as the tube is tilted. The Mercoid tube carries full current either 110 or 220 volts, A.C. or D.C. in sufficient volume to operate 1 H.P. motors direct. No transformers or relays are required. The tilting action is obtained through the use of a brass bellows. For temperature control the bellows element contains a volatile liquid expanding with temperature advance to give the necessary operative force. For pressure control, the pressure of steam, air, water, etc., acts directly on the bellows.

The demonstrating exhibit referred to consists of a wood panel, across the top of which are mounted (1) an electric lamp, (2) a motor-operated valve, and (3) an electric fan to simulate the blower of an oil burner or the motor of a refrigerating outfit. Each of these devices is wired to the sockets or jacks shown directly below them. Across the lower portion of the panel are mounted (4) a Mercoid thermostat, for house control or oil burners, box control or refrigeration, etc., (5) a Mercoid temperature control of the remote stem type with flexible connecting tube, (6) a Mercoid pressure control such as is used on steam heating boilers with a range of 1½ lbs. to 15 lbs., and (7) a Mercoid vapor control (also vacuum) with operating range 2 oz. to 5 lbs.

Demonstration Outfit for Mercoid Control of Temperature, Pressure and Vacuum

The leads from the Mercoid controls are wired to the plugs shown directly above each. The plugs are equipped with extension cords on pulleys as with the ordinary telephone switch board. All controls are equipped with two circuit switches so that it is possible to demonstrate control for either heating or cooling. For example: by connecting the center and left-hand plugs of the thermostat (4) to the fan, an advance in temperature will stop the motor, as for oil burning. By connecting the center and right-hand plugs, an advance in temperature will start the motor, as for refrigeration. Demonstration is provided by setting the thermostat one degree above room temperature and breathing on the thermal element. Similarly, pressure controls are demonstrated by cooling the bulb at (5) operating the bicycle pump at (6), or blowing in the tube at (7). The motor valve (2) requires three-wire connection, hence all three plugs from each control are used. The motor valve is single-seated and is operative on pressures from 75 lbs. to 250 lbs. depending on the size. One-half revolution of the main gear shaft opens the valve; the next half revolution closes the valve. The motor is of the

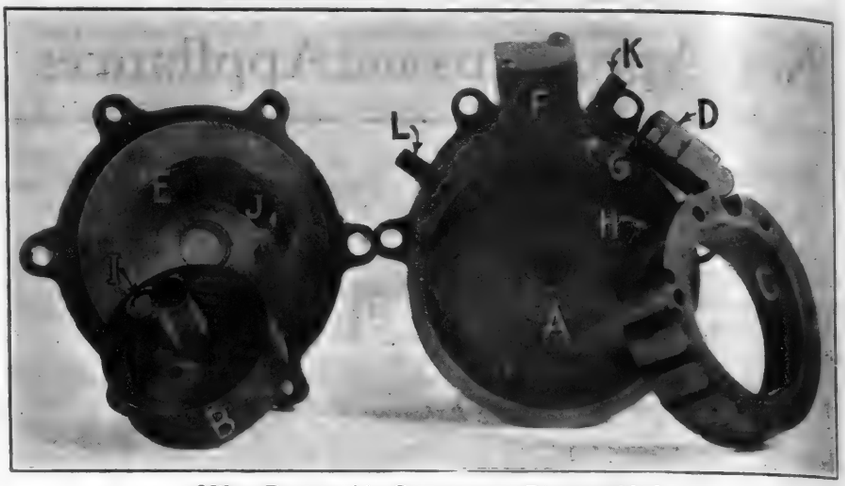


Design of Mercoid Control

universal type using 110 volt current, either D.C. or A.C., any frequency. By reversing plug connections, the motor can be demonstrated either closing or opening on advancing temperature or pressure.

New Rotary Compressor of Novel Design, With Uses in Many Fields

A compact rotary compressor, without valves, with practically no vibration at high speeds, and of remarkable simplicity, has been designed by John Milne, 273 Greenwich Street, New York. There are but three essential moving parts, and valve action is replaced by the proper synchronizing of three ports which are simply holes in the cover plate, the rotor and the rotor ring. As the working parts are all rotative, it is



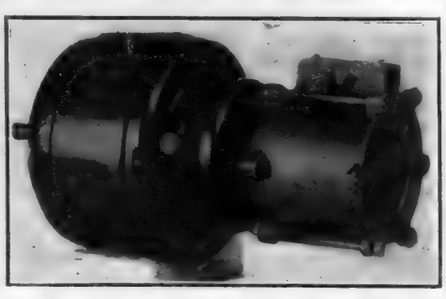
Milne Rotary Air Compressor Disassembled

not difficult to secure a high degree of balance, reducing sound and vibration to a minimum.

The compressor consists of a cylinder *D* inclosed between two end covers, *F*, the cylinder being divided internally into two chambers by a hollow transverse partition *E*, through the center of which the motor shaft passes; on this shaft is mounted, on either side of the partition *E*, an eccentric piston *A*, which rotates within a ring *B*, the ring itself being kept from rotating by engaging with a "sliding partition" *C*, which is free to slide up and down in ways within the boss *G* on top of the cylinder casing.

Compression takes place in the narrow annular space between the peripheral surface of the ring *B* and the inner wall of the cylinder *D*. Kept from rotating as it is by *C*, which is free to slide vertically on its ways in *G*, the ring receives from the eccentric rotor piston *A* the only motion possible for it, which is as follows:

Starting at a point immediately to the right of *C*, the sliding partition, the peripheral surface of the ring *B* is brought into momentary elemental contact with the inner surface of the cylinder *D;* this elemental contact of the two surfaces continues in a clock-wise direction as the eccentric piston turns, until, at last completing the cycle, contact has been made immediately to the left of the sliding partition *C*. The air inlet is at *I*. Before the cycle of contact or compression above described is begun, air enters this port, filling the space between the ring and the cylinder wall. This port is first closed by the ring itself as the rotor begins to turn. As the turning continues, the air thus entrapped is squeezed or compressed between the ring and cylinder wall and forced into a continually decreasing space ahead of the advancing point of contact, until, just as the cycle is completed, the three outlet ports, *J* in the ring, *H* in the rotor piston, and *L* in the cover, come into register with each other, permitting the compressed air to escape from the cylinder. The sliding partition *C* serves as a partition between the inlet and outlet portions of the cylinder—whence its name. Thus no communication is possible between intake and outlet ports. When the ports are not in register they act as a check valve for the air in the cylinder and the air in the outlet piping. Unloading devices are said to be unnecessary, and for many purposes the compressor can be used without a receiver.



Milne Rotary Air Compressor Attached to Motor

New Air Filters Developed by Sprayco

Impacting the dust in the air against viscous-coated surfaces, by rapidly changing the direction of the air by these same surfaces, features the air filters developed by the Spray Engineering Co., Boston, Mass., These filters, made up in units, 20 in. x 20 in. x 4 in., are set into steel frames, enough units being used to permit the filtration of the requisite amount of air. Each unit is rated at 800 cu. ft. per minute, at an average resistance, when dirty, of less than ¼ in. of water.

The units are composed of successive layers of expanded-metal screens, each so shaped that the air, striking the surfaces at an angle with normal flow, is deflected against the angular surfaces of the next layer, which is of smaller mesh. The result is a series of impacts during the passage through the four inches of filter. The fluid used is described as non-freezing, non-inflammable, non-volatile, and odorless. Handles are fixed to each unit to facilitate handling.

It is stated that these filters will remove 98% of the dirt from air passed through them, when given proper care and attention. Cleaning is recommended every six weeks, under ordinary operating conditions.

Automatic Coal Stoker For the Small Furnace

A small automatic stoker, controllable by thermostat, has been placed on the market by the Yarwood Heating Service, Inc., Buffalo, designed to serve medium-sized furnaces, and to utilize the smaller and cheaper sizes of coal. The unit consists of a hopper, which may be carried on a pipe frame, and rolled to the coal bin for filling. The hopper is suspended from a post which may be swung to one side for filling, or may be of the overhead type, where the hopper is carried to the bin on an overhead track. The feeding apparatus consists of an American Blower unit and a feeding device, the motor being under thermostatic control. When steam pressure or temperature drops, the motor is started, and blows a charge of coal over the surface of the fire. Enough coal is supplied at one time to augment the fire, without smothering it. The operation is repeated as required until the magazine, holding from 300 lbs. to 2000 lbs. of coal, is emptied. Federal Mercoid control is used. The use of this stoker is designed to reduce the attendance to a minimum, all that is necessary being the recharging of the magazine at intervals which may be stretched to convenient lengths.

New Trade Publications

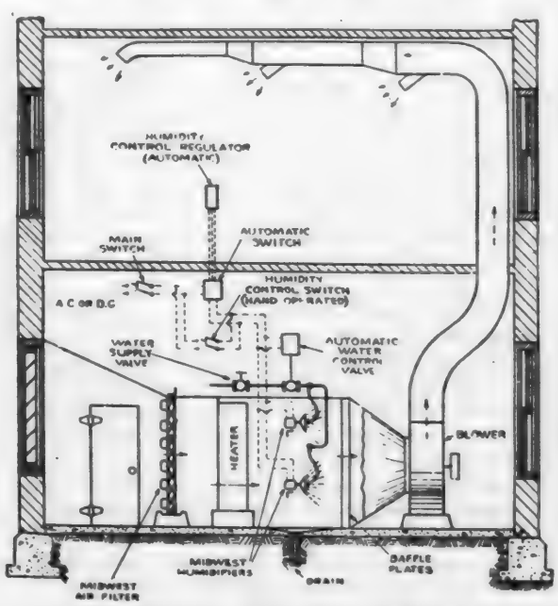
MIDWEST REMOTE CONTROLLED HUMIDIFIER is described in a folder issued by Midwest Air Filters, Inc., New York. This device consists of two units, the humidifier, and the automatic control unit. The humidifier incorporates a cone-shaped disc of metal, mounted at the end of the shaft of an electric motor, and rotated at high speed. Water is fed to the apex of the cone through a stationary pipe entering the cone from the front. The water is thrown from the periphery of the disc with sufficient force to break it up into a fine mist, which is picked up by the air passing between the edge of the disc and the surrounding cover, or guard. The guard further acts as a collector of such water as may be thrown off before the disc gets up to speed. The automatic control functions on the motor circuit and the water valve. When the humidity reaches a set minimum, the motor is started, the water turned on, and this state continues until the required maximum humidity is reached, when the controller acts to shut off the humidifier. This installation is designed to maintain humidity within 2% of any desired point. A single unit consumes 140 watts of electrical energy, and, handling up to 100 lbs. of water per hour, can humidify 10,000 cu. ft. of dry air per minute at 70° F. to 40% relative humidity. The units may be combined with air filters, heaters and fans to produce almost any required conditions.

HALVE YOUR COAL BILL is the suggestive and alluring title of a little booklet sent out by the New York Service Co., New York. This describes the system developed for burning small sizes of anthracite coal in heating plants, using essentially a control panel and a minute electric blower, with special grates where necessary. It is stated that savings of 50% in cost of fuel can be effected through the use of the smaller sizes of coal that cost, in New York, in the neighborhood of $6 per ton, as against $14 per ton for larger sizes of the same coal. No additional labor is required, firing periods in Fall and Spring may be lengthened, and many installations, it is claimed, have returned their entire first cost in the savings effected during the first heating season. It is interesting to note the figure claimed as the cost of operating the blower—less than four cents per ton of coal burned—so that the operating cost for an entire season would be only a dollar or two in a large home, or corresponding building.

REILLY OIL HEATER is the title of a leaflet issued by the Griscom-Russell Co., New York. This describes a device for preheating heavy oil for oil burners, using live steam instead of waste steam, on account of the low heating value of the latter. Oil is circulated through seamless steel tubing enclosed in a shell, through which the steam passes. There are no joints within the heater, which are tested to pressures of 250 lbs. and above. The Reilly heaters are manufactured in several sizes, with capacities from 200 gal. per minute to 400 gal. per minute.

RECORDING GAS-FILLED THERMOMETERS form the subject of an elaborate catalog issued by the Bristol Co., Waterbury, Conn. Nitrogen gas under pressure is used as a working medium, giving a uniformly graduated chart scale and permitting a temperature range between 60° F. and 1000° F. Where low tem-

Rear View of Midwest Humidifier Showing Motor and Revolving Disc



Midwest Humidifier and Air Filter Installed in Typical Fan-Blast Heating System

peratures are to be recorded, a compensator is used, making these instruments as accurate as those of higher range. The catalog covers the many types and sizes for specialized use, with all necessary data and prices. Sample charts are shown, and many types of bulbs listed. Size 8½ x 11 in. Pp. 56.

GORTON SINGLE-PIPE VAPOR HEATING SYSTEM is described and illustrated in a small folder issued by Gorton & Lidgerwood Co., New York. This system makes use of the Gorton line of valves, air eliminators and other specialties.

HORNUNG PRESSURE AND TEMPERATURE MASTER CONTROL is the title of a folder issued by the Central Heat Appliance Co., Chicago. This control is made in two types, one for pressure and the other for both pressure and temperature control, especially adapted for control of steam heat as served from a central heating plant.

DUAL THERMOSTAT devoted to the new day and night temperature control, is a recent catalog issued by Johnson Service Co., Milwaukee, Wis. A story of the development of conditions that produced this control is followed by a description of the device that makes it possible to maintain night temperatures of 70° in desired parts of a building, while the unused portion is held at much lower temperatures until required for occupancy the following day. A complete description of the Johnson dual thermostat was published in THE HEATING AND VENTILATING MAGAZINE for March. Size 8½ x 11 in. Pp. 16.

TABASCO WATER HEATERS AND KEWANEE HORIZONTAL AND VERTICAL GARBAGE BURNERS, in which the burning of waste material heats water in quantities from 200 to 2600 gal. per hour, are featured in folders received from the Kewanee Boiler Co., Kewanee, Ill. The Tabasco heaters are made in both surface and magazine-feed types in 17 sizes to heat 130 to 700 gal. of water 50° per hour.

KEELER DOUBLE-DUTY BOILER, adapted for use in small industrial plants, as well as for heating buildings where the installation does not warrant the expense of a brick-set boiler, has been brought out by the E. Keeler Co., Williamsport, Pa., and is described in a new catalog. The boiler requires no more floor space than the ordinary heating boiler. It is constructed of one large-diameter shell to which are riveted two smaller shells or drums. A bank of 3-in. tubes placed in vertical rows passes from the front head of the small drums into the rear head of the large shell. Between these tubes and extending from head to head in the larger shell is a bank of 4-in. tubes. The boiler is made without a curved crown sheet so that no stays are required. There are also no flat braces required between the tubes and no stay bolts in the furnace in contact with the fuel bed. The boiler is made of steel plates of flange or fire-box quality and is built to A. S. M. E. requirements. Either up-draft or down-draft furnaces are supplied, although the standard construction is up-draft. Size 6 x 9 in. Pp. 12.

TITUSVILLE FIREBOX BOILERS, including the Tyco return tubular portable firebox type, the Tyco smokeless down-draft return tubular portable type and the Acme firebox type and smokeless type, brick-set for steam and water heating, are presented in Catalog No. 85-A, issued by the Titusville Iron Works Co., Titusville, Pa. Full specifications are included for each type. The text is arranged in handy form for convenient use. Size 6 x 9 in. Pp. 16.

SAFEGUARDING HEATING AND SERVICE PIPE LINES is the title of a data and specification book prepared for architects and issued by Grinnell Co., Inc., Providence, R. I. This book contains a complete analysis of pipe hanging problems, and the data are so arranged as to be of easy reference and use. The book is replete with examples of almost every problem likely to be met in practice, and is voluminously illustrated with diagrams, drawings and photographs of interesting installations. Many detail drawings show the methods of using Grinnell fittings to the best advantage. Size 8½ x 11 in. Pp. 40.

ADSCO HEATING RADIATES COMFORT is the title given to Bulletin No. 181 issued by the American District Steam Co., No. Tonawanda, N. Y., devoted to the Adsco system of thermostatic steam (vapor) heating. Some interesting notes are given of the inception of the Adsco system, followed by a presentation of the various Adsco devices, together with a typical layout. The catalog concludes with a number of illustrations of different types of buildings in which the Adsco system is in successful use. Size 8½ x 10½ in. Pp. 16.

ECONOMY PUMPS AND RECEIVERS are described and illustrated in a catalog issued by Economy Pumping Machinery Co., Chicago. These are electric-driven pumps, and receivers for various conditions and pressures. They are used to improve the circulation in sluggish heating systems, as well as to drain radiators, coils, heaters, etc., which are below the boiler level. In power plants and industrial establishments they are used to return water, oils, and chemicals from gravity-circulating systems to overhead tanks. Several types are described, and their characteristics tabulated in sizes ranging from 7½ g. p. m. to 110 g. p. m. A vertical underground pump and receiver of the same range of capacity is also shown. The last page contains illustrations showing the other lines manufactured by this company. Size 8½ x 11 in. Pp. 16.

How Grinnell Pipe Hangers are Used for Supporting Pipe Coil Heaters in a Ford Plant

ABSORBO is the title of a four-page folder showing the uses of cork for foundation pads under machinery, and is issued by the Cork Foundation Co., New York. Natural cork is cut into standard sheets up to 24 in. x 48 in., in size, and 1½ in. thick, and these, impregnated with creosote, are impervious to oil and water. Set under reciprocating or impact machinery, much of the vibration is absorbed.

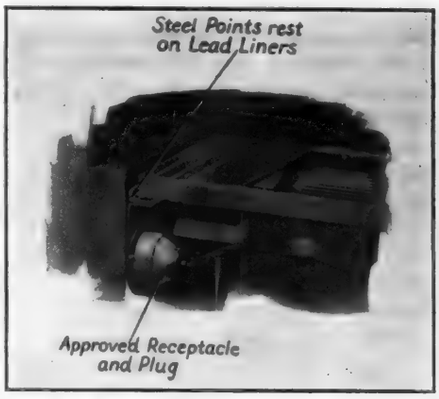
INTERNATIONAL ECONOMY BOILERS are presented in an attractive catalog issued by the International Heater Co., Utica, N. Y. A complete story of the round and square sectional types of boilers is told, and all necessary ratings and sizes are tabulated. Attention is called to the design of the grates, with the shaking mechanism outside of the ashpit. The rocking grate sections may be operated from either the right or left side of the boiler, and the draft door

has been placed at the side, instead of the front, in order that the damper chain will not interfere with firing. In the square type, there are four flues, two carrying the gases forward, and the upper pair connecting back to the stack. In the lowest of these passages, the gases moving to the front are subject to direct contact from flames from the fire-pot, flashing up through three-quarter inch spaces between the sections of the crown sheet. This is designed to produce reignition of the carbon monoxide contents of the gas, and to increase the evaporative power. It is stated that the temperature in this lower flue is higher than in the fire box, during the first hour or two of the firing period, owing to the combustion of the volatile gases escaping from the raw fuel. Size 8½ x 11 in. Pp. 36.

STICKLE THERMOSTATIC RADIATOR TRAP is described in a folder, issued by the Stickle Steam Specialties Co., Indianapolis, Ind. No claim is made of novelty in principle, but it is stated that the materials and workmanship are such that the trap will function with certainty over a long period of time.

VOGT HAND STOKERS are described in a publication of Vogt Brothers Mfg. Co., Louisville, Ky. This stoker is designed to secure distillation of the volatile matter in the coal on the extreme front of the grate, so that these gases pass over the entire bed of incandescent fuel. The booklet describes and illustrates the construction of the grate in detail.

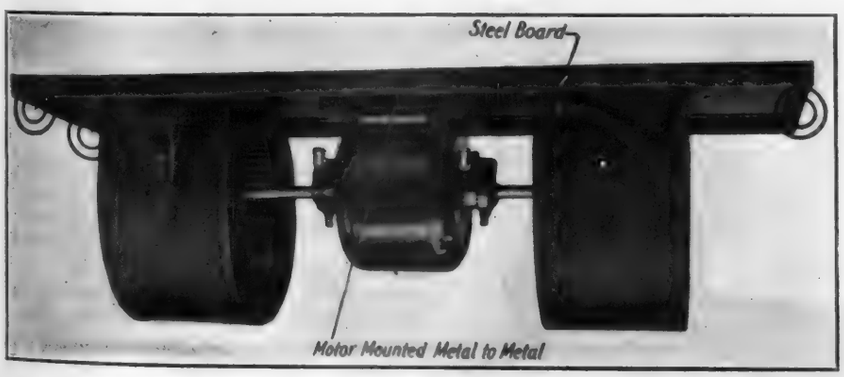
UNIVERSAL UNIT VENTILATION SYSTEM is the title of a catalog and engineers' data book prepared by John J. Nesbitt, Inc., Atlantic City, N. J. A number of typical installations are shown, as illustrations and as section drawings, and the various methods of utilizing Universal Unit Ventilators are described, as well as illustrated. The catalog then shows the construction and use of the



Detail of Lead Liners Used With Universal Unit Ventilators to Minimize Vibration

to minimize vibration, details of the fan design and construction, constructional and thermal data of the extruded copper-tube radiator, and the methods of securing thermostatic control of the unit. One section is devoted to considerations of various methods of using Universal units, in the split, modified and blast systems. Steam requirements when using the various systems, are analyzed, and methods of computation given. Tables of capacity are followed by instructions for roughing-in. Detailed specifications have been prepared, as well as a very complete outline of the electrical characteristics under which the units are designed to operate. Several pages are devoted to considerations of the wiring of the units, and the methods of control. Typical wiring diagrams are given, and all co-related data that might be of use to heating engineers or contractors. Size 8½ x 11 in. Pp. 56.

ILLINOIS ECLIPSE STEAM TRAP titles a four-page folder describing the product of the Illinois Engineering Co., Chicago. Ten points of interest are listed, a section of the trap shown, and the tabulated data covering capacities of the various sizes, are given.



Method of Suspending Motor Fan Unit. Three Steel Points Resting on Lead Liners Minimize Vibration

various parts of the unit, the air filters, which are of the adhesive impingement type, the intake and recirculating damper, which controls the quantity and source of incoming air, the direct-indirect feature, the method of suspending the motor-fan unit on three steel points

DUNHAM MAGAZINE for June carries, in addition to much matter of personal interest to the Dunham organization members, the third of a series of articles on the design and installation of the Dunham home heating system.

COOK SAFETY AUTOMATIC OIL PUMP, TYPES D AND F, are illustrated and described in bulletins issued by the Cook Electric Co., Chicago, Ill. The function of this pump is to provide for a uniform supply of oil to domestic oil burners, obviating the use of an inside tank. The pump will handle 1000 gal. of fuel at a cost of from five to ten cents, so that its cost of operation throughout a heating season is practically negligible. The bulletins contain installation and capacity data, and also show a hydrostatic oil gauge for use with oil-storage tanks.

TRANE HEATING SPECIALTIES are described and listed in a new bulletin (No. 14) issued by Trane Co., LaCrosse, Wis. The new Trane bellows packless radiator valve is cataloged for the first time, and complete data are given covering several disinterested tests of radiator traps. Schematic cuts of the Trane radiator trap system of vapor heating are shown, with a full description of the functioning of the essential parts. Size

New Trane Bellows Packless Radiator Valve

8½ x 11 in. Pp. 16, punched for N. T. E. B. binder.

National Pipe and Supplies' Association Convention Finds Business Conditions Healthy

Generally satisfactory reports of business conditions in the industry marked the sixteenth annual convention of the National Pipe and Supplies Association, held at French Lick, Ind., May 26-28. W. E. Clow, Jr., of Chicago, president of the association, presided, and his report received unusual attention. He strongly urged the utmost co-operation within the association, and stated his belief that such unsatisfactory conditions as existed, were the result of failure in harmony. Based on commercial construction reports, C. K. Foster, vice-

president of the American Radiator Company, contended that business this season should surpass that of last year, as over 3000 more buildings have been erected in the first four months of the current year than during a similar period last year. The standardization program prepared by the association was adopted, as was a resolution to support the effort of the National Association of Credit Men to eliminate fraudulent schemes. Following a testimonial resolution to retiring President W. E. Clow, Jr., the election of officers resulted in the following new personnel:

President, M. W. Dennison; first vice-president, H. W. Strong; second vice-president, W. C. Hanson; executive committee, J. J. McArdle and Murray W. Sales, re-elected, while Munn Cochrane and W. M. Pattison were elected to serve with Isidor Weil, J. A. Vann, A. L. Taylor and Francis J. Baker, the four members of the old committee to be retained.

Present Accepted Practice in Domestic Oil Burners

Three Types Which Use Widely Varying Methods in Securing Similar Results.

1. **Kleen-Heet**—***Vaporizing, Gravity Feed, Fire-Pot Type.***
2. **Baker**—***Atomizing, Pump Feed, Fire-Pot Type.***
3. **Kerrihard**—***Vaporizing, Atmospheric, Gravity Feed Type.***

1. Kleen-Heet

A DOMESTIC oil burner that has been upon the market for five years, is listed by the Underwriters, and has been accepted by the New York Board of Standards and Appeals, is manufactured by the Winslow Boiler & Engineering Company, Chicago, and sold under the trade name "Kleen-Heet."

In this burner, a combustion chamber in the form of a fire-pot terminates the blast tube, which projects into the ash-pit of the furnace. This fire-pot is of a special cast metal in the small sizes, and in the larger units a lining of special fire-resisting material, similar to that used for crucibles, is inserted.

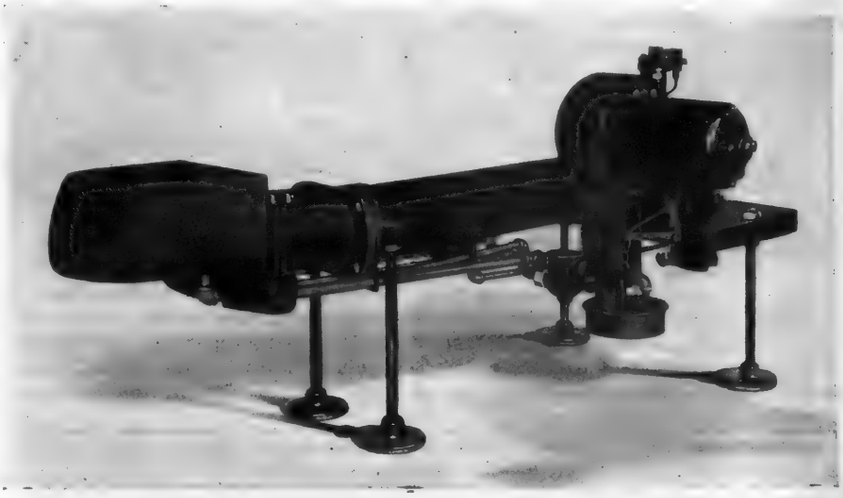
AIR SUPPLY AND VAPORIZING PLATE

The blast tube is divided at its outer end, so that the air stream enters the fire-pot in two streams. Between the entrance of these air blasts into the fire-pot is placed the vaporizing plate, a brass plane, sloping toward the center of the fire-pot, upon which the oil drips from the open-end of a ¼-in. pipe.

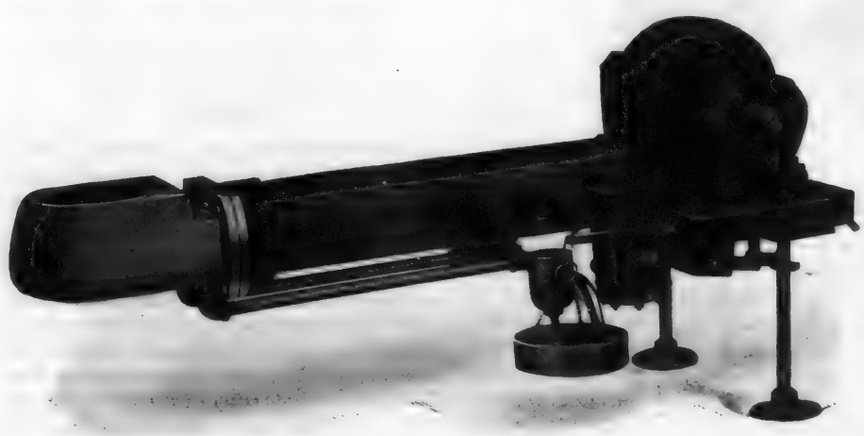
The vaporizing plate is heated by a gas pilot flame, located below it, which also ignites the oil gas vapors when the burner is started. The protected location of the pilot light is designed to prevent any chance of its being blown out by the first rush of air. The low velocity of the incoming air is also a factor in insuring continued functioning of the pilot. The air blast is obtained through the medium of a slow-speed electric motor-driven Sirocco fan, the air being regulated by a damper in the fan housing. Housed with the motor is a small vacuum pump that provides for a vacuum on a small fuel tank, which directly feeds the burner.

MAGNETIC VALVE CONTROLS FUEL SUPPLY

A simple magnetic valve is interposed in the fuel line between the vacuum tank and the combustion chamber. This valve is constructed of bronze except for the armature, which is steel. When the burner is not in operation this valve, which is a very blunt needle valve, is held closed by gravity, the weight of the steel disc being sufficient to insure positive seating of the needle in its ground seat. The coils of the valve magnet are in parallel with the motor circuit, so that when the motor is started, the valve lifts from its seat, allowing oil to flow from the vacuum tank through the large feed pipe to the vaporizing plate. Any interruption to this motor circuit, either through thermostatic control, or through accident, results in the oil valve dropping, closing instantly, through gravity.



Kleen-Heet oil burner showing motor-driven blower with vacuum pump, safety overflow pan and enclosed magnetic valve just behind



Kleen-Heet Jr. oil burner, embodying all the essential features of the larger unit

The system incorporating the vacuum tank introduces another link in the chain of safety devices, as the maximum amount of oil in the vacuum chamber is only a pint, so that, should anything happen to prevent the valve closing, this is the greatest amount of oil that could flow into the fire-pot.

The "court of last resort" is the conventional overflow which drains any oil

from the combustion chamber into a brass cup suspended from a trigger, the tilting of which opens the motor circuit, and requires manual resetting. Conventional thermostatic control is provided, with a range from 50° F. to 90° F. The vacuum tank is of standard make, similar to that used in the automotive industry, and maintains a constant head, which is necessary to the proper functioning of the burner. A suitable brass screen, easily cleaned, is provided, to prevent any particles of dirt or sediment from being carried from the tank to the valve.

ELECTRIC IGNITION WHERE GAS IS NOT OBTAINABLE

In order to provide for operation where gas for the pilot is not available, a burner with electric ignition is listed, in which a residual amount of oil fuel, left in the magnetic valve, is ignited by the spark from a small Bosch magneto, the exhaust of the vacuum pump being utilized to furnish the air. This heats the vaporizing plate and furnishes ignition for the main oil supply. A small unit known as the model GJ is designed for Arcola and similar installations. The standard and electric-ignition types are made in thirteen sizes, designed to provide heat for loads of 600 sq. ft. of radiation to 8000 sq. ft. Kleen-Heet is listed to burn distillates of 36°—40° A.P.I., with flash point not less than 105° F., or higher than 190° F.

2. Baker

Combining in an interesting way several unique details, the Baker oil burner, manufactured by the Baker Steam Motor Car and Mfg. Company, Pueblo, Colo., has been marketed for five years. It is listed as standard by the Underwriters, and has the approval of the New York Board of Standards and Appeals, and the Department of Public Safety of Massachusetts.

In the Baker burner the fire-pot is of distinctive design, being surrounded on its periphery by an air chamber, through which the air is conveyed from the blast tube to the opening into the fire-pot, which is on the opposite side from the atomizing nozzle.

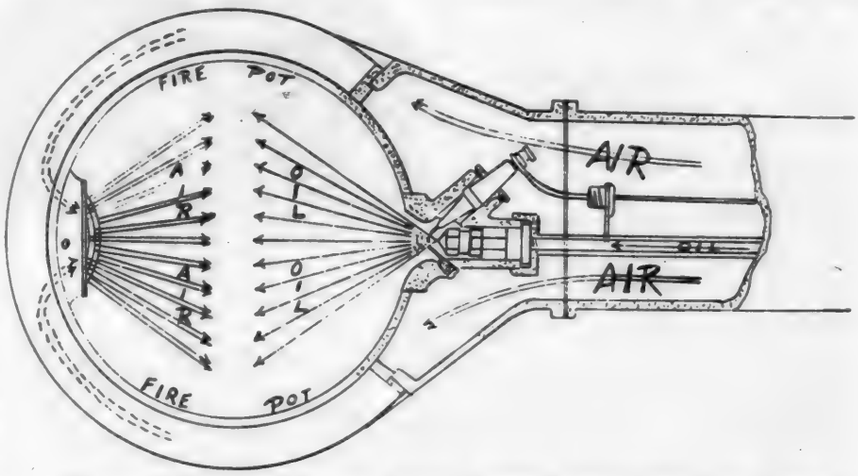


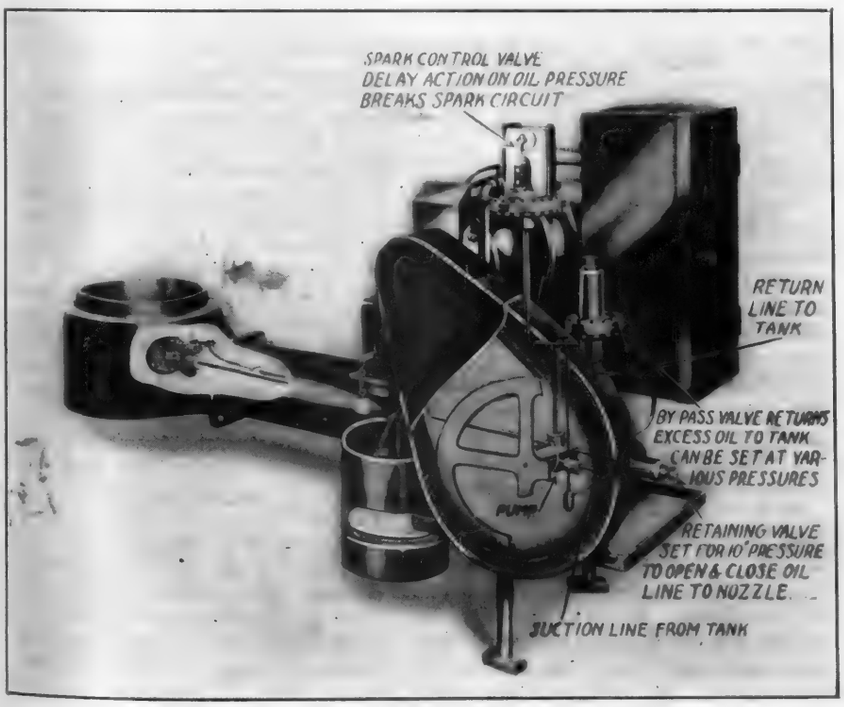
Diagram of Baker oil burner, showing location of atomizing nozzle, and air-jacketing of fire-pot, with incoming air impacting on oil spray

METHOD OF FEEDING AND CONTROLLING OIL FUEL

Considering, first, the oil feed, we find an oil pump driven by the blower motor, working against the atomizing nozzle, and a by-pass, through which excess oil that is not required at the nozzle is returned to the oil tank. A second valve, set at 10 lbs. pressure, holds the oil from the nozzle until this pressure has been reached. A third valve, in reality, a switch control, holds the ignition circuit closed until thirty seconds have elapsed.

When the burner is started, oil from the pump passes through the retaining valve, and is held back of the nozzle until the necessary pressure is built up, as controlled by this valve. The valve then functions, allowing the atomizing nozzle to spray the oil into the combustion chamber. The spark continues throughout the time set to assure ignition, when the spark circuit is interrupted by the delayed-action switch control. Coincident with the starting of the pump, the blower forces air through the blast tube, around the outside of the fire-pot and into the pot through a grilled opening opposite the spray nozzle. Due to the large area of the blast tube, (5 in. diameter) the velocity of the incoming air is low, and this same velocity is maintained in the passages around the fire-pot. Low air velocity in a large measure makes for quietness in the flame, and the preheating of the air is also a factor.

The vanes of the opening deflect the air downwards, so that it strikes the lower part of the oil spray, and, by virtue of the high relative velocities of the two impacting, a very complete mixing of the air and oil particles results. In addition to thus permitting the air to be driven into the face of the oil cone, this design secures the preheating of the incoming air, which assists combustion. The use of simple electric ignition renders gas unnecessary for pilot use, and makes one design of burner adapted to all conditions of installation.


SPARK CONTROL VALVE
DELAY ACTION ON OIL PRESSURE
BREAKS SPARK CIRCUIT
RETURN LINE TO TANK
BY PASS VALVE RETURNS EXCESS OIL TO TANK CAN BE SET AT VARIOUS PRESSURES
PUMP
RETAINING VALVE SET FOR 10 PRESSURE TO OPEN & CLOSE OIL LINE TO NOZZLE.
SUCTION LINE FROM TANK

Pump and control valves of Baker oil burner, showing simplicity of mechanism

DIRECT OIL PUMP SAVES PIPING

With the oil pump of this unit drawing directly from the outside, or inside buried storage tank, no basement service tank is required, and the installation is thus simplified. There is also a benefit derived from having a minimum amount of piping and fittings in the oil lines.

Conventional thermostatic control takes care of the burner operation. An overflow from the fire-pot drains to a trip bucket, which operates a safety cut-off valve, requiring manual resetting.

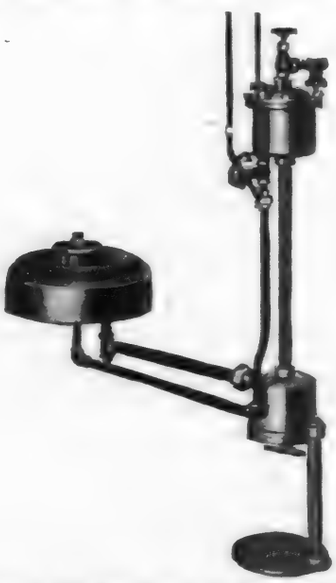
The Baker burner is designed to operate on any light distillate having a specific gravity of 38°—41° A.P.I., and a flash point of not less than 105° F., or more than 160° F.

3. Kerrihard

Of the many atmospheric burners developed in and adjacent to the mid-west oil-producing area, the Kerrihard is outstanding in simplicity, and has been on the market long enough to indicate the potentialities of this type of burner. The manufacturers, the Kerrihard Company, Red Oak, Ia., state that nearly four thousand of these burners have been installed within the last three years. The earliest of the Kerrihard burners were designed and built to provide for the demands of the officers of the company, which has been engaged in the manufacture of furnaces and other heating equipment for over thirty years.

BURNER COMPOSED OF BUT THREE CASTINGS

The burner consists of but three cast-iron parts, a circular casing, a vaporizing cone, and a cover plate. Oil is piped to the bottom of the casing, and passes up to the top of the vaporizing cone, in which the oil pipe terminates. It flows over the top of the cone and down its sides, the rate of flow being



General Arrangement of Kerrihard Oil Burner, Constant-Level Chamber and Safety Overflow Tank

controlled by a needle valve in the fuel line. After the burner has been started, the cone retains enough heat to vaporize the oil before it reaches the bottom of the cone, and the resulting oil-gas passes out the holes in the bottom of the cone, to mingle with the incoming air, burning just above the top of the cone, and being thrown outward by the shape of the spreader and the cover plate.

There are no small orifices inside of the fire-box, and the castings, with the single exception of the spreader unit, are not subject to disintegration in any degree.

SIMPLE OIL FEED

Oil is fed to the burner from a constant-level chamber mounted on a stand outside of the furnace, and the control

Detail of Kerrihard Oil Burner Showing Path of Air

valve is arranged so that it may be operated by thermostat. Of course the burner is not of the intermittent type, the valve being arranged with maximum and minimum stops so that the fire is either "idling," or on full, when under thermostatic control. When hand controlled, any degree between the extremes may be secured. The safety feature consists of a drain from the bottom of the burner to a closed overflow chamber, which is designed to shut off the oil to the burner when it is full, and, through a simple arrangement, to prevent oil from being fed to the burner until the safety tank has been drained through a bottom plug, and the plug replaced.

The Kerrihard burner is designed to burn 38°-40° A.P.I. distillate, "furnace oil" or kerosene.

Deaths

JOHN W. FRYER, for many years associated with the American Radiator Company, died on May 29, in New York, of intercarditis. Mr. Fryer, who was seventy years old, had been for practically twenty years manager of the showroom of the New York office of the American Radiator Company, during which time he came into contact with a large portion of the clients of the company in the East and had a hand in the training of many of its salesmen.

In the middle-west where Mr. Fryer spent much of his early career, he was one of the first exponents of water heating. After a brief association with the Richmond Stove Company, Mr. Fryer entered the heating contracting business in New York, but a severe illness made it impossible for him to continue. He then joined the American Radiator Company's organization in which, through the period of its growth, he was an important factor in maintaining pleasant and intimate contact with its growing clientele, a large portion of which depended upon him for assistance in intricate heating problems.

Mr. Fryer is survived by his widow, one son, Herbert, manager of the Salt Lake City branch of the Carnegie Steel Company, and a daughter, the wife of Raymond H. Bookhout, editor of Sanitary Heating and Engineering.

JOHN LONG, president of S. Faith & Co., Philadelphia, died May 18, after an illness of nearly three years. Mr. Long was identified with the heating and ventilating industry for nearly half a century, his first association, with Wright & Brothers, dating back to 1879. In 1883 he became identified with S. Faith & Company, which association lasted until his recent retirement from active business. Mr. Long was one of the "old guard" among Philadelphia heating contractors, and has been, since 1918, a member of the American Society of Heating and Ventilating Engineers.

WILLIAM A. PITTSFORD, well-known throughout the technical world as an expert on combustion, died April 17. Mr. Pittsford was a member of the engineering staff of the Kewanee Boiler Company, and prominent in the activities of the American Society of Heating and Ventilating Engineers, the Smoke Prevention Association, the American Society of Mechanical Engineers, and other technical societies.

JOHN J. OSTRANDER, a well-known figure in the manufacturing, jobbing and heating trade, died at his home in Toledo, O., May 3. Mr. Ostrander was born in Bath, N. Y., in 1838. He was appointed postmaster by President Lincoln shortly before the Civil War. During the war he served as captain in the New York volunteer infantry. Soon after the war he became associated with his previous school-mates, Lewis M. and Moses Rumsey, under the firm name of L. M. Rumsey Manufacturing Company, St. Louis. In 1877 he organized and was manager of the Gould and Ostrander Company, St. Louis, manufacturing and jobbing heating and plumbing supplies. This organization was absorbed by the N. O. Nelson Manufacturing Company, about 1881. Soon thereafter Mr. Ostrander became manager of the sales department of the Rumsey and Sikemeier Company, and later was secretary of the Continental Radiator and Foundry Company. After severing his connection with this company, he moved to Toledo, from which point he corresponded with various magazines and trade journals until his death. One son, P. H. Ostrander, is associated with the National Supply Company, Toledo, the other, Lewis F. Ostrander, is vice-president and manager of the O-E Specialty Manufacturing Company, Milwaukee, Wis.

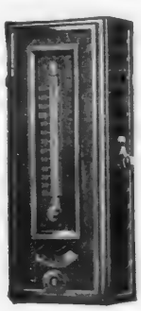
Minnesota State Capitol, St. Paul, Minn.—Cass Gilbert, Architect—W. I. Gray & Co., Heating Contractor

In Constant Service Since 1903

A POWERS System of Temperature Control

Alec Nicoll, Chief Engineer of the Minnesota State Capitol Building, says of the POWERS System of Temperature Control:

"* * * has been in constant use since 1903 * * * still working satisfactorily * * * have had very little trouble * * * still good for another long period."



The POWERS Thermostat is the secret of the accuracy, dependability and long life of the POWERS system.

This is only *one* instance of the long and satisfactory service which the POWERS System renders. Our book "The Elimination of Heat Waste," gives many more. If you haven't a copy in your library, send for one. You'll find it valuable.

(3107A)

THE POWERS REGULATOR COMPANY

34 years of specialization in temperature control

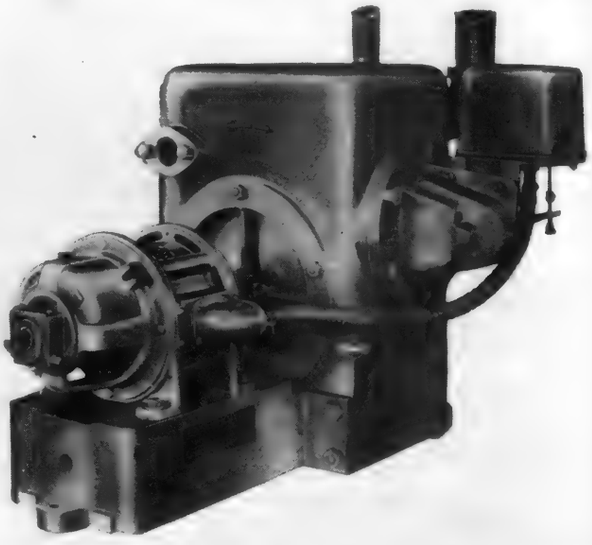
2718 Greenview Ave., Chicago

Atlanta, Baltimore, Boston, Buffalo, Butte, Mont., Charlotte, N. C., Cincinnati, Cleveland, Denver, Des Moines, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, Nashville, New Orleans, New York, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Seattle

CANADIAN OFFICES: Toronto, Montreal, Halifax, Winnipeg, Calgary, Vancouver

Jennings Condensation Pumps

Motor Driven Jennings Hytor Condensation Pump, Unit Type, for removing condensation from steam heating systems and returning it under pressure to the boiler or hot well. Supplied in sizes for equivalent direct radiation up to 16,000 sq. ft. Standard units designed to deliver full capacity against 15 lbs. pressure at the pump. Larger capacities when so ordered.



Pay for themselves in service rendered

Superior features of the Unit Type Pump

Saving in space: The rectangular form permits installation in a corner against the wall.

Low returns connection: Distance from center line of gravity returns connection to floor a minimum.

Quiet operation: Absence of flexible coupling and elimination of separate steel returns tank insure noiseless operation except for slight motor hum.

Impeller: Bronze, open type, self-cleaning.

Cast iron receiving tank: Reinforced cast iron tank, tested by hydraulic pressure. Has large settling chamber.

Companion flanges: Supplied for connections to system. No connections between the pump and the tank are required.

Wiring: Furnished in armored conduit between motor and switch, connected, ready for use.

Ball float: Heavy 5 in. diameter, seamless drawn ball float, tested to 100 lbs.

Float switch: G. E. double-pole float switch, with silver contacts, totally enclosed. Float mechanism can be removed as a unit.

Drip pan: Base forms drip pan, tapped for drain.

Motor bearings: Rugged, with liberal oil wells.

Three point support: Prevents misalignment.

Systems having radiation surface at or below the boiler water line cannot depend on gravity alone for returning the condensation to the boiler, unless the boiler is set in a sufficiently deep pit.

In installations where condensation is being discharged to the sewer, instead of returned to the boiler—coal is continually wasted. In fact, about 1% is needlessly consumed for each 11° F. the condensate is above the temperature of the cold boiler feed water.

Under conditions such as these, the importance of the Jennings Condensation Pump cannot be overemphasized. It effectively removes condensation from the heating system, and returns it under pressure to the boiler.

Jennings Condensation Pumps not only result in greater economy of the system as a whole, but they invariably pay for themselves in the costly boiler pit excavations they avoid, in the fuel they save through improved operation, and in greater cleanliness and efficiency of the boiler plant.

For a complete description of the Jennings Pump, its design, construction, and method of operation, write for illustrated Bulletin No. 29.

NASH ENGINEERING COMPANY

So. Norwalk **Connecticut**

Branch Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Washington. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, Eng., Norman Engineering Co.; Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Hytor

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Miscellaneous Notes

Wichita, Kans.—It is reported that all of the Wichita (Kansas) schools that are within range of the mains now being laid in that city, will be heated with natural gas, supplanting the oil burners that have been previously used. Price was the consideration, the school board having been able to contract for gas at 17½c per 1000 cu. ft. About 8000 barrels of oil were used last heating season, and the board will probably purchase 3500 barrels for use in the isolated schools during the following season. It is stated that the company now piping gas into Wichita has contracted for 15,000,000 cu. ft. to 47 local industries.

Sycamore, Ill.—Unable to supply the demand for steam for commercial and residential heating in Sycamore, Illinois, the Illinois Power Company is installing two new boilers of greatly increased capacity to replace three small ones now being removed. The improvements will be completed in time for the beginning of the heating season next fall.

Building Operations during May, 1925, continued at a record-breaking rate, according to the report of F. W. Dodge Corporation. The total for the month was $496,042,100.00, in the 36 eastern States. This was the second highest monthly total ever recorded, having been exceeded only by that of the month previous. There was an increase of 18% over May, 1924.

Last month's record included the following important items: $231,182,200, or 47% of all construction, for residential buildings; $80,280,100, or 16% for commercial buildings; $77,759,400, or 16% for public works and utilities; $29,312,700, or 6% for educational buildings; and $27,562,000, or 6% for industrial plants.

New England's building contracts in May amounted to $46,222,300. The increase over April was 16%; over May, 1924, 17%.

May building contracts in the Central West (Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas and Nebraska) amounted to $139,649,700. Although this registered a seasonal decline of 11% from April, it was 46% over the amount for May, 1924.

Construction started during the month of May in Minnesota, the Dakotas and Northern Michigan, amounted to $12,629,600. This is the largest monthly figure recorded for the district since June, 1923. The increase over April was 39%; over May of last year, 9%.

New York Building Congress has, for for some time, been studying ways and means for securing a higher grade of training for apprentices in the plumbing and pipe fitting trades in the metropolitan area, and, as the result of the efforts of Francis Mahoney, head of the apprenticeship commission of the congress, co-operation has been secured between the congress and the journeymen's representatives, which, it is announced, will result in the establishment of suitable classes in every borough of Greater New York.

Refrigerating World, New York, which for nearly fifty years has served the refrigerating, cold-storage and ice industry, has new owners. G. Warren Wheeler, president of the Wm. R. Gregory Company, publishers of *Bakers' Review*, has purchased one-half of the stock of The Ice Trade Journal Company, and the balance of the stock has been acquired by Miss A. Smit, who has

Volume Sales Reduce Price!

Volume sales of the Autovent portable Window Ventilator makes it possible for us to now offer this high grade home unit at a figure that places it within the reach of every family.

The Ventilator itself remains the same—there has not been any change in specifications. Every unit is equipped with a standard 12-inch Autovent fan with a continuous duty power motor, mounted on an adjustable sheet steel panel with angle iron frame, painted in attractive battleship gray. NOW ONLY $49.00

Write today for your attractive discounts.

AUTOVENT FAN & BLOWER CO.

730-738 W. Monroe St. Chicago

been with the publication for sixteen years, and who, for several years, has served as secretary of the company. Mr. Wheeler is the new president and treasurer. C. G. Wood will continue as editor.

Chicago Heating & Piping Contractors Association held its annual banquet at the Hotel Sherman, Chicago, June 11. At the business meeting which followed the banquet it was announced that the membership had increased from a total of 20 last December, when the Heating & Piping Employers' Association and the Steam and Hot Water Heating & Piping Contractors Association were amalgamated, to a membership of 45. An increase in membership to 100 is anticipated by the end of 1925.

American Construction Council and the American Railway Association at a recent joint meeting in New York, devoted a large measure of time and energy to considering ways and means for providing a higher class of construction for American homes, and, at the same time, for eliminating wasteful labor peaks and depressions. The council has established a clearing house on information for home owners, builders and lenders of money as to approved principles and practices on sounder financing of homes, as well at better building. The council is also active in its endorsement of schools for the proper training of apprentices in the building trades. Efforts will be made to bring about a more uniform distribution of federal, State and municipal buildings throughout the year, and to foster the carrying out of all repair work in such season as finds the necessary artisans least busy in the installation of new work.

Manufacturers Notes

Hoffman Specialty Co., Waterbury, Conn., has appointed George H. Padington district sales representative, with headquarters at 679 Norfolk Ave., Buffalo. C. I. Connolly has been appointed to represent the company in North Carolina, Virginia and the District of Columbia, with headquarters at 1716 Floyd Avenue, Richmond, Virginia.

Uehling Instrument Co., Paterson, N. J., has appointed Charles M. Bullard, Appleton, Wis., as its representative for central and northwestern Wisconsin, to handle the Apex Co. recorder and other power plant instruments.

Grinnell Company, sales subsidiary corporation of the General Fire Extinguisher Co., Providence, R. I., has established a branch office in Minneapolis, Minn., for the distribution of its products in the northwest. T. T. Cash, who has represented the Grinnell Company in this territory for some time, will be in charge of the office, which will be located at 240 Seventh Avenue, South.

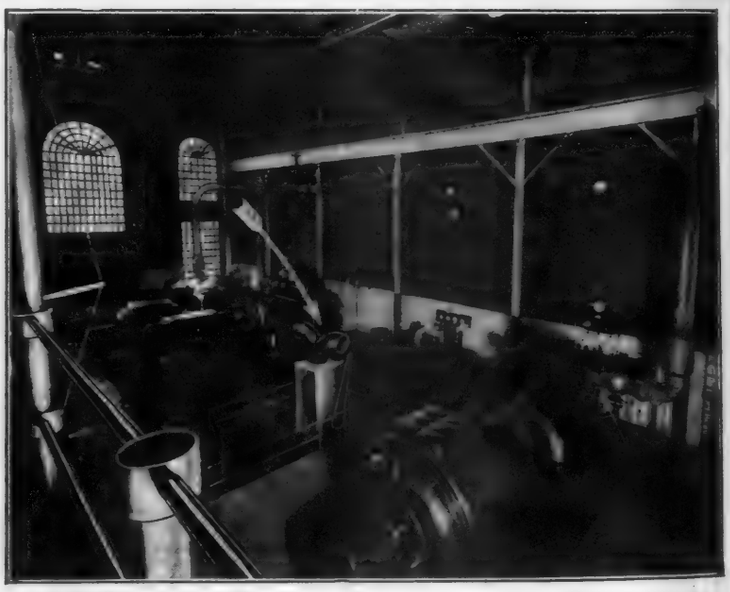
Standard Heater Co., Williamsport, Pa., has started construction of a new manufacturing plant in Williamsport.

Geist & Murphy, sales engineers, Cincinnati, O., have opened new offices and showrooms at 309 Main Street. Geist & Murphy represent the C. L. Bryant Corporation, General Boilers Company, Economy Pumping Machinery Company, Ray Fuel Oil Burner Company and the National Pipe Bending Company.

Gorton & Lidgerwood Co., New York, announces the appointment of Peacock Brothers, Ltd., Montreal, Canada, as sales agent in the Dominion of Canada and Newfoundland, for the Gorton packing lock modulating radiator valve. Peacock Brothers, Ltd., has offices in the leading cities throughout this territory and are well equipped to handle this Gorton specialty.

Trane Co., LaCrosse, Wis., has appointed Irving S. Dane to be manager of its Boston office. Mr. Dane is an experienced heating engineer, having been

Pecco Heaters



are sold on sound engineering basis. This is proven by the above installation of the PECCO STEAM HEATER installed in the engine room of the Laclede Gas Light Company, St. Louis, operating under steam pressure of 125 pounds and driven with a three-quarter horsepower motor. We invite you to write Mr. W. P. Daniels, engineer of the Laclede Gas Light Company, asking him to tell you about the results he obtained from this PECCO HEATER as compared with other fan blast unit heaters that they have installed in different parts of their building. PECCO HEATERS are sold on an absolute guarantee and operate on live or exhaust steam. Wherever steam is not available PECCO DIRECT FIRED work just as well. PECCO HEATERS are serving as well at the Pauly Jail Building Company, Scruggs, Vandervoort and Barney, Kregal Casket Company, Griffith Furniture Company and many others. Write for full details of this equipment and catalog.

PECCO INCORPORATED

2957 North Market Street SAINT LOUIS, MO.

CONCRETE
CHANNEL IRON OR I-BEAM
UNDER DRAIN
TOP – ANCHOR PIT – SOMETIMES CALLED A BLIND PIT
BOTTOM – SECTION THROUGH SHUTTER ILLUSTRATES PIPES ENTERING BUILDING
EARTH FILL
TILE CONTAINING MEMBER
JOHNS-MANVILLE ASBESTO-SPONGE CONDUIT-FILLING
SUPPLY PIPE
RETURN PIPE
ROLL FRAME
BROKEN STONES OR GRAVEL
BROKEN STONES OR GRAVEL
BROKEN STONE
UNDER DRAIN
DOUBLE MANHOLE COVER
CONCRETE
MAINS TO OTHER POINTS
CONCRETE
SECTION SHOWING METHOD OF CONSTRUCTION AT MANHOLE
1
2
3
4
The above illustration shows a line insulated with Johns-Manville Conduit Filling, but where special conditions warrant, or engineers prefer, lines can be efficiently insulated with Johns-Manville Asbesto-Sponge Felted Sectional Pipe Insulation.

1. Straight Section. 2. Supporting Section. 3. One-roll Frame. 4. Four-roll Frame.

Johns-Manville Underground System of Insulation

Through Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

COMPONENT parts and ordinary construction details of the Johns-Manville System are shown above.

These carefully designed elements are adapted to the specific job by experienced Johns-Manvill engineers. They are then installed under Johns-Manville supervision. The result is a system which we are able to assure you will be permanently satisfactory, giving an efficiency of at least 90%—frequently more.

JOHNS-MANVILLE

JOHNS-MANVILLE, INC., 292 MADISON AVENUE AT 41st ST., NEW YORK CITY
Branches in 63 Large Cities. For Canada: Canadian Johns-Manville Co., Ltd., Toronto

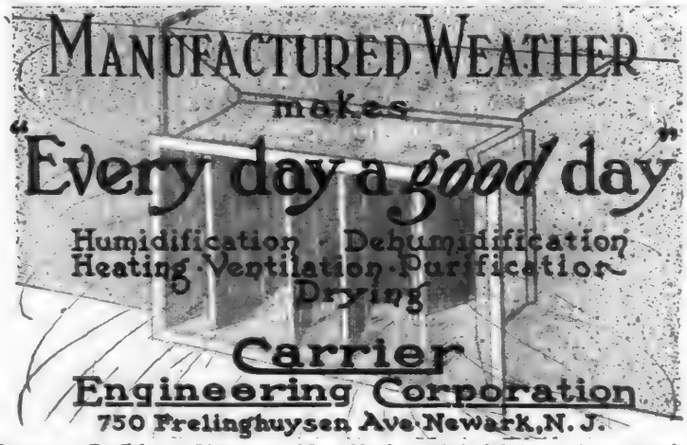
connected with the Boston office of the American Radiator Company as sales engineer of the specialties department. The Boston office has been moved from 110 State Street to Boston, 57, Massachusetts.

Hoffman Specialty Co., Inc., New York, announces the following changes in its sales department: Maurice H. Bjerken, 200 Builders Exchange, Minneapolis, Minn., has been appointed district sales representative, replacing D. C. Jones in the Minneapolis district. E. W. Stitt, former manager of the United States Radiator Corporation at Pittsburgh, has been appointed district sales representative in the Pittsburgh territory. Mr. Stitt's address is 1535 Fairlawn Avenue, Pittsburgh, Pa. Lee Mandl, 512 Fifth Avenue, New York, has been appointed district sales representative to cover the territory of Brooklyn and Long Island.

Allen Air-Turbine Ventilator Co., Detroit, has occupied its new and greatly enlarged plant at 1040 Fourteenth Street. The new building is of the latest fireproof type, with elaborate lighting, heating and ventilating equipment, and much of the machinery is here used for the first time. This change has been necessitated by development of business and to facilitate prompt shipment of orders.

Gorton & Lidgerwood Co., New York, announces that, following four years of experience with its product in thirty-five installations planned and supervised by the office of Lawrence M. Loeb, architect, of New Rochelle, N. Y., Mr. Loeb will specify the Gorton single-pipe vapor system in all of his new work. This will include six apartment houses and a hotel, now on the boards.

Marine-Galligan Co., Philadelphia, advises that Alfred Tiefield, formerly an engineer of the Hoffman Company, has



SEE OUR DETAILED DATA IN ASH&VE GUIDE

SEE OUR DETAILED DATA IN ASH&VE GUIDE

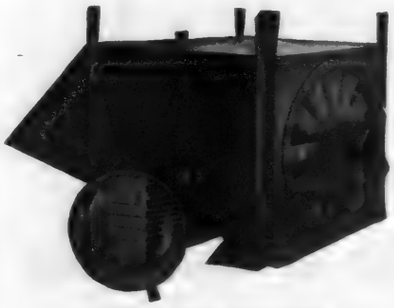
Boston Buffalo Chicago New York Philadelphia Los Angeles

WHY LET THAT UNHEATED BUILDING WORRY YOU

We manufacture Unit Heaters and Fan Heating Systems for every need. If steam is not available, our all steel direct fired Fan Furnace will meet your requirments.

Send us your heating problems and we will show you the easiest and cheapest way.

Recommendations and prices furnished cheerfully without cost to you.



COMET UNIT HEATER

Suitable for use where steam and hot water is available. This Heating Ace is especially adapted where compactness and lightness in weight is of importance. For complete description write for Bulletin No. 85.

DIRECT FIRED FAN FURNACE

For use where steam or hot water is not available. For complete data write for Bulletin No. 90.

THE NEW YORK BLOWER COMPANY

CHICAGO, ILL. *Branch Offices in Principal Cities* LA PORTE, IND.

Sylphon Bellows Patents Upheld

The Fulton Company vs. The Bishop & Babcock Co.

In the District Court of the United States for Delaware on May 12, 1924, Judge Hugh M. Morris entered a consent decree and held The Fulton Company patent No. 1411487 to be valid and infringed by the Bishop & Babcock Company.

In the District Court of the United States for the Northern District of Ohio, Eastern Division, on February 13, 1925, District Judge Westenhaver held The Fulton Company patents No. 971838 to be valid and infringed by the Bishop & Babcock Company and by a decree signed by Judge Westenhaver on May 15, 1925, the Bishop & Babcock Company are enjoined from infringing this patent or using the process of this patent in the manufacture of bellows.

The Fulton Company vs. Janesville Laboratories Inc. and Edgar J. Leach

In the District Court for the Western District of Wisconsin, on March 31, 1925, Judge Claude Z. Luze entered a decree and held The Fulton Company patent No. 971838 valid and infringed by Janesville Laboratories Inc. and Edgar J. Leach, and enjoined the defendants from further infringement.

The Fulton Company were pioneers in the bellows field

The Sylphon Bellows is obtainable only in products sold under Fulton license. Make sure that equipment embodying the bellows principle is made with the *genuine* Sylphon Bellows, the exclusive product of The Fulton Company, Knoxville, Tennessee. Sylphon specialties are: temperature regulators, damper regulators, air valves, packless valves, and various other applications for the control of temperature and pressure.

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL, SEAMLESS SYLPHON BELLOWS
Sylphon

Why you should specify and obtain the genuine Sylphon Bellows

Every genuine Sylphon Bellows is drawn and formed seamless from a flat sheet of specially prepared metal. All corrugations or folds are exactly alike, so that the finished bellows when tested will stand hundreds of thousands of extensions and compressions without any appreciable deterioration in the physical qualities of the metal.

THE FULTON COMPANY KNOXVILLE, TENN.

ORIGINATORS AND PATENTEES OF THE SYLPHON BELLOWS

Sales offices in: NEW YORK, CHICAGO, DETROIT, BOSTON, PHILADELPHIA, *and all the principal cities in the U. S.*
European representatives: Crosby Valve & Engineering Co., Ltd., 41-42 Foley Street, London, W. I., England
Canadian representative: Darling Bros., Ltd., 120 Prince Street, Montreal, Canada

joined its engineering department, designing M-G vapor vacuum heating systems.

Heggie-Simplex Boiler Co., Joliet, Ill., calls attention to the fact that the manager of its St. Louis office is Irwin J. Cozzens, instead of I. J. Gozzen, as reported in these columns in June.

Lyon Products Co., Chicago, Ill., manufacturers of Lyon interlocking heaters, is now located in the Union Trust Building, Chicago.

Reliance Engineering Co., Philadelphia, which, for several years has been associated with the Kernchen and Arex companies, manufacturers of siphon ventilators, announces that it has secured patent rights for a unique improvement in the siphon ventilator, which consists in arranging the siphons spirally, producing a rotary motion, and creating a much greater suction. These ventilators will be marketed as Reliance ventilators, by the Reliance Engineering Company.

WANTED

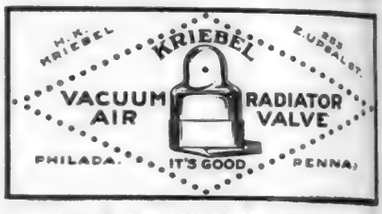
Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

POSITIONS OPEN

Salesman—Prominent manufacturer of heating equipment wishes to employ several men experienced in selling cast-iron boilers and radiators for locations in the West. Excellent opportunity is offered to men of training and ability to earn good income and advance in organization. State education, business connections, age and present employment. Address Box 71, care Heating and Ventilating Magazine.

Salesman—To a man who has been successful in selling reducing valves, traps or steam specialties to power plants and consumers, we offer an exceptional opportunity. Apply by letter, with full details of experience. Address Donnelly Systems Co., 9 Murray St., New York.

PATENT AND PROTECT
Your valuable inventions
and
Register your trade marks.
Prompt attention. Superior Service
Lester L. Sargent, Patent and Trade Mark Attorney.
524 10th Street, Washington, D. C.



SOLD BY SUPPLY HOUSES

STEAM TRAPS
AIR TRAPS
STEAM SEPARATORS
EXHAUST HEADS
OIL SEPARATORS
BOILER ALARM WATER COLUMNS
STRAINERS

WRIGHT — **AUSTIN**

WRIGHT-AUSTIN CO. — DETROIT, MICHIGAN

OZONE FOR HEALTH

In Nature our Atmosphere is continuously under IONIZING INFLUENCES.

IONIZATION IS ESSENTIAL TO CHEMICAL ACTIVITY. Air is useful to man for its CHEMICAL ACTIVITY.

HOUSED AIR is CUT OFF from NATURAL IONIZING INFLUENCES. IT IS LARGELY DE-IONIZED.

OZONIZED AIR IS HIGHLY IONIZED, hence OZONIZED AIR IS HEALTHY AIR, it is essential to the adequate ventilation of buildings.

We maintain our own Research Laboratories and Engineering Staff. Technical publications on OZONE sent on request.

MONTGOMERY BROTHERS

Chicago
1020 So. Wabash Avenue

San Francisco
61 Fremont Street

New York
50 Church Street

General Sales Agents for

THE UNITED STATES OZONE COMPANY

SCOTTDALE, PENNA.

The Acid Test Already Made

THE Grinnell Pipe Hangers you can now buy anywhere have already met the acid test we applied to them as piping contractors. That test was low labor cost and permanently satisfactory work. They are no inventor's dream to be exploded by the first practical pipe fitter that uses them. A dozen million actually installed is your guarantee of the practical value of easy adjustability and wide usefulness under any structural conditions.

Send today for Hanger Catalog No. 3. It contains complete data and illustrations of over 100 hangers.

If your jobber doesn't stock Grinnell Hangers write us for the name of the nearest distributor. Address Grinnell Co., Inc., 280 W. Exchange Street, Providence, R. I.

GRINNELL

Fittings, Hangers, Valves, Pipe Bending Welding, Piping Supplies, Etc.

Steam Pressure Range— 0 to 120 lbs. Guaranteed

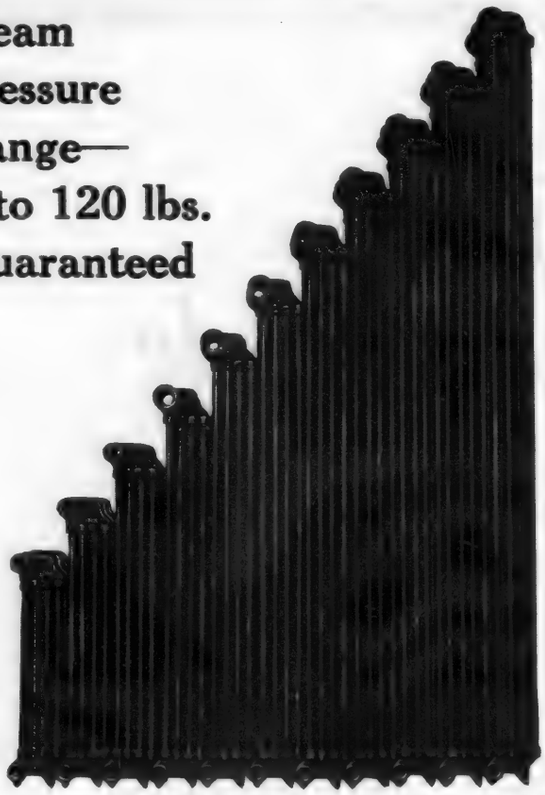


Illustration showing different heights of Lyon Heaters—made in steps of 10 inches from 40 inch to 140 inch lengths.

Lyon Interlocking Heaters for Hot Blast

Lengths to meet all requirements—no Decking.

All Prime Heating Surface With Greater Efficiency.

Being closely assembled they take up less space.

Their light weight requires no expensive supports.

Made of full strength Spellarized Steel pipe.

Substantial Headers and Bases of semi-steel.

Prices compare favorably and saving made on freight.

Valuable Data FREE Our 68 page catalog containing over 70,000 result figures of data on final temperatures and condensations from certain intake temperature and velocity, mailed free to Engineers, Architects and Contractors of record—write for it.

LYON PRODUCTS CO., Inc.
7 So. Dearborn Street Chicago, Ill.

Sterlco
TRADE MARK

The Sterlco-Roys Thermotrol

TYPE B

The new model Type B Thermotrol controls room temperatures accurately.

Can be used at top or bottom of radiator.

Valve has universal connection for top, bottom, left or right connection.

No wall thermostats, air compressors or piping necessary.

Regulation secured through thermostatic action.

Write for Bulletin No. 38.

STERLING ENGINEERING COMPANY
1626-40 Holton Street, MILWAUKEE, WIS.

These Days Are Gone Forever

If you want to know how to get rid of the expansion tank nuisance in your hot water installations—just ask your jobber about Mueller's **tankless** Automatic System of Water Heat Control. By this better, safer, no more costly method of control, thousands of plumbers have made life easier for themselves—at the same time they have done their customers a favor.

Note the diagram below—it shows **everything** that is needed. There is no overhead open tank or closed basement tank to handle and install. This is a Mueller development—a Mueller reducing valve combined with a Mueller relief valve and a positive, automatic draft and damper regulator. The water is supplied automatically. Safety relief is automatic.

Write for details and ask your jobbers for particulars—kiss the old expansion tank goodbye!

Distributed by Leading Jobbers Everywhere

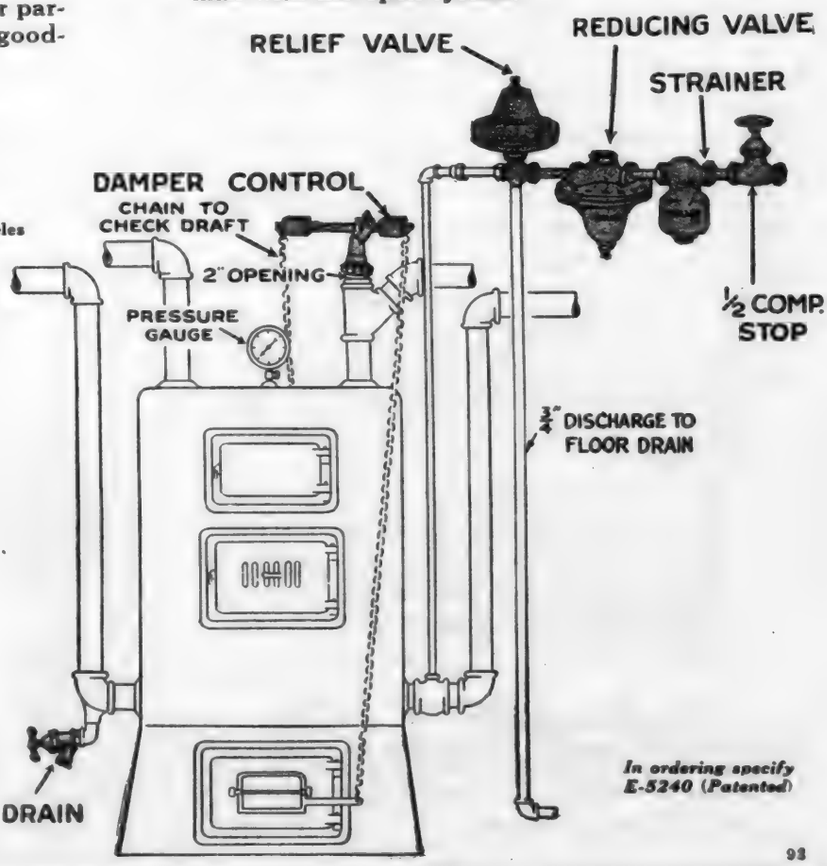
MUELLER CO.

(Established 1857)

Factories: Decatur, Ill., Port Huron, Mich.
Branches: New York, San Francisco, Los Angeles
Canadian Factory: MUELLER, Ltd., Sarnia

Mueller Automatic Hot Water Heat Control

1. No expansion tank, either open or closed.
2. Quickly installed on either new or old jobs.
3. Water in system always fresh.
4. Rapid circulation, due to pressure and fresh water.
5. Entirely automatic as to supply, relief and damper regulation.
6. A very considerable saving in fuel, due to automatic control of dampers and rapid circulation.
7. Perfectly safe, as both reducing valve and relief valve are operated by the pressure of the water in the system.
8. The reducing and relief valves are positive in action and durable, the working parts being made of bronze with phosphor bronze diaphragms.
9. The boiling point of water raised to higher point than with the open system.



In ordering specify E-5240 (Patented)

ALBANY PARK HEATING COMPANY
Steam, Vapor, Hot Water, Heating and Ventilating
3218 Montrose Avenue
Chicago

Mueller Co.,
Decatur, Illinois

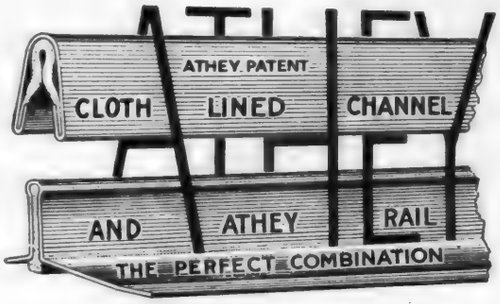
Gentlemen:

Your advertising in the trade papers on your heating system has attracted my attention and I thought perhaps you would be interested to know that we put our O. K. 100% on what you say about it.

Any up-to-date heating contractor who investigates the advantages of a heating system like yours over the old closed tank or open tank system will soon be won over to Mueller. One beauty about your proposition is that it doesn't cost the property owner a cent more to install this system when he is building. From our standpoint it requires less labor and gives us a nice profit on every system that we put in.

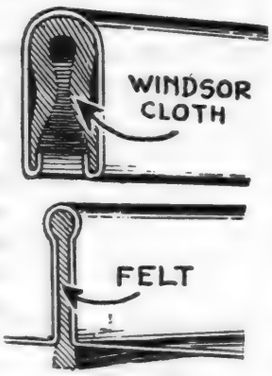
Sincerely yours,
John Schroeder,
Albany Park Heating Company.

At last! A perfect weatherstrip



A metal-to-cloth contact is the only method yet devised which makes a weatherstrip air and dust tight without making the windows hard to open and close. And the ATHEY is the ***only cloth-lined metal weatherstrip made.***

Study the enlarged view. See what perfect contact the ATHEY gives. Yet the cloth is sufficiently pliable so that the windows never ***stick,*** as is so often the case in weatherstrip relying on a metal-to-metal contact.



Enlarged View

You can't suck flour through a window ATHEY equipped, even with a vacuum cleaner. It is the only weatherstrip used successfully in the Southwest where dust storms occur frequently.

In one big building on Chicago's Lake front the installation of Athey Weatherstrip saved 572 tons of coal in one heating season. The entire cost of installing was saved in a little more than a season.

Athey Company

6031 West 65th Street - Chicago, Illinois

THE FACT

That After 15 Years the First

Knowles Mushrooms

Are still in Perfect Condition has something to do with their

Present Popularity

Patented
Knowles "Notch" Type Air Diffuser

They have always been castings of the best grey iron, and made to withstand all kinds of abuse incident to

Public Auditoriums

Knowles Mushroom Ventilator Co.
202 Franklin St., New York

AIR CONDITIONING TRADE MARK

APPARATUS for maintaining artificial atmospheric conditions in industrial plants.

ATMOSPHERIC CONDITIONING CORPORATION
LAFAYETTE BLDG.
PHILADELPHIA

GOLD CAR HEATING & LIGHTING NEW YORK

AUTOMATIC

HEAT REGULATION

ELECTRICALLY OPERATED

Packless Electric Valve

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

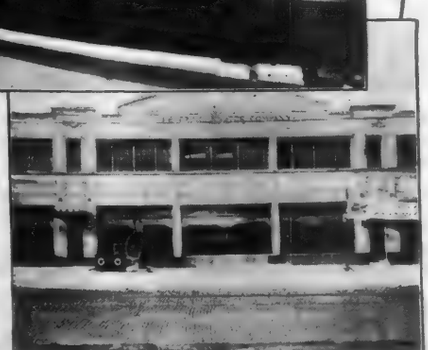
Thermostat

Write for General Catalog with Testimonials

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.

The new VENTURAFIN Method of Heating 1/10 the Weight 1/4 the Space!

Yet — tremendously increased heating efficiency and Lower Costs



This one Venturafin Unit in the upper right hand corner of top photograph heats a room 50 x 100 feet—note the compactness of this unit.

LINCOLN FORD FORDSON

DAY AND NIGHT SERVICE
PRINCE MOTOR CO.
L. S. PRINCE, PRESIDENT
FORD AND LINCOLN SALES AND SERVICE

CARS TRUCKS TRACTORS

1107-1113 FRANKLIN STREET
PHONE 388
MICHIGAN CITY, IND.

Simpson & Adamson,
Michigan City, Ind.

FEBRUARY 4, 1925

Gentlemen:

We are very much impressed with the heating system known as the "Venturafins Heating System", which you installed in our new Ford and Lincoln building.

We have five coils and fans located in the building from which we get our heat. The work shop which is 100 x 75 feet has two of these fans and during zero weather it was only necessary to run both of these fans part of the time. We receive plenty of heat from the fans if driven about seventy five percent of the day and up until about twelve at night.

Our service department is 80 x 100 feet and we have two of these fans installed in this section. We have three large doors in the rear which are 12 x 12. These doors are continually being opened and consequently letting in a lot of cold air, but by running the two fans, we obtain very fine results and always plenty of heat.

In our showroom which is 100 x 50 feet, we have but one fan. This fan in zero weather is only turned on about fifty per-cent of the time and the temperature is always about seventy-five degrees.

The fan system in itself eliminates a lot of radiation and it has been installed in our office fixtures so that it is practically unseen.

We are very much pleased with the heating system, the results obtained from same and the low cost, and we desire to take this opportunity to express our thanks to you for recommending the installation of this system.

Very truly yours,

LSPw PRINCE MOTOR COMPANY

Send for technical data

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(454)

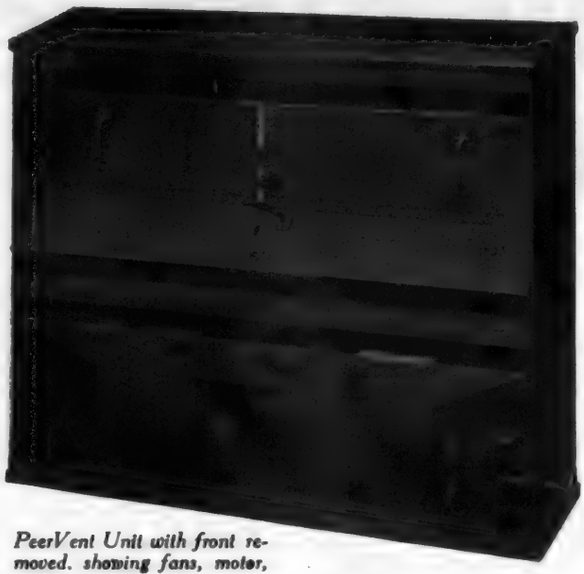
American Blower

"Sirocco" TRADE MARK VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

Manufacturers of all Types of Air-Handling Equipment —— Since 1881

PEERVENT

Heating and Ventilating Unit



PeerVent Unit with front removed, showing fans, motor, and mixing damper.

THIS new PeerVent Unit is only 36 inches high by 14 inches deep. Does not interfere with windows or obstruct light, and occupies minimum space in aisle. Equipped with Peerfin radiator, the most efficient ever developed for ventilating units, manufactured in our own factory, subject to rigid inspections and tests. Has all advantages of older types of Peerless Units: Independent service for each room. Thorough ventilation without drafts. Noiseless operation. Adaptable to all steam systems. Easy to operate. Always in working order. Big cost and space savings. Easy to install. No remodeling required for old buildings.

The new ***PeerVent*** *Catalogue will be finished soon. Send your name and address now and you will get one of the first copies off the press.*

PEERLESS UNIT VENTILATION CO., INC.
SKILLMAN AVENUE AND HULST STREET
LONG ISLAND CITY, NEW YORK

PEERLESS
UNIT SYSTEM
Heating and Ventilating

Better Industrial Heating at 1/3 to 1/2 the cost!

Wing Featherweight Unit Heaters provide a better system than direct radiators because they save coal, and valuable floor and wall space. They heat the plant quickly and uniformly.

Cost less to install because one unit will do the work of a number of radiators, thus one installation instead of several—require less valves, traps, fittings, etc., and no distributing ducts or pipe trenches.

We would welcome an opportunity to submit data on Wing Featherweight Unit Heaters for comparison.

L.J. Wing Mfg. Co.

Fans and Blowers *Damper Regulators*
Unit Heaters *Small Turbines*

Hudson and 13th Streets **NEW YORK CITY**

SELF OILING BEARINGS

AN EXCLUSIVE AND PATENTED FEATURE OF

Supreme Multiblade Disc Fans

Successfully Applied to Mechanical Furnace Systems.

Drying, Cooling, Ventilation and General Factory Service.

PRICES SHOW SAVINGS OF 20 to 30%

Noted for accessibility of bearings — Located outside of fan—Positively dustproof.

The blade design is rendering efficient and economical operation under all conditions of service.

Write for Catalog today

Supreme Heater & Ventilating Corp.
Engineers and Manufacturers, ST. LOUIS, MO.
SALES ENGINEERS - Some desirable territory is open on this line

For VENTILATION use LYON Toad Stools

They are Vent Caps of great strength, unobstructed throat, rigid non-rattling construction. The adjustment is from full open to full closed. The height of the floor member prevents sweeping dust and refuse into them. Their efficiency and economy make them particularly adaptable for theatres, auditoriums, etc.

Send for table of capacities and velocities. Prices on

LYON PRODUCTS CO., Inc.
7 So. Dearborn St.
CHICAGO ILLINOIS

Carrier Air Washers reduce temperature 10° to 16° in hot weather:

Fortunate indeed are those who work in buildings "cooled by Carrier."

The extremely hot weather prevailing over the country makes each bank, school, office building, theatre, store, public building, hotel and manufacturing plant where a "Carrier System" operates, stand out in the mind of the community like an oasis.

The first week in June, while the out-door temperature at 33rd and Broadway was 93° to 96° in the shade, the Equitable Building, across from the Pennsylvania Station had a temperature on the first floor of 83°. Cooling to this extent makes a building popular; draws tenants or employees, and in the case of theatres, hotels, banks and stores, increases patronage.

To get the full value from your Carrier system, run it every day in the year. In hot weather, pure cooled air with just the right humidity, will make the atmosphere invigorating; in cold weather, washed, warmed air without a trace of dryness keeps colds and sore throats away. And remember, the Carrier system is the only one to give these results with efficiency and economy, and is sold with a guarantee of satisfaction.

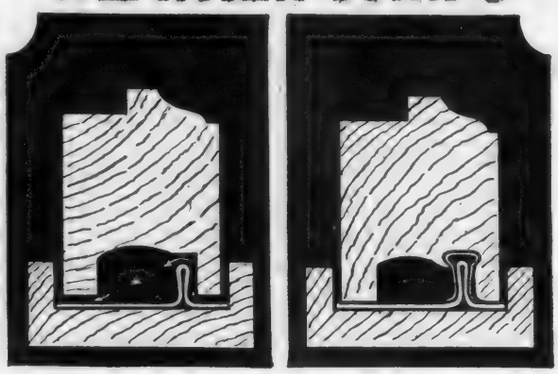
A perfect spraying system (using Buffalo Spray Nozzles) an excellent washing surface, a very low frictional resistance to air, and an operating efficiency far beyond the ordinary make the "Carrier" story particularly interesting.

WRITE FOR IT

Carrier Air Conditioning Co., of America

480 BROADWAY BUFFALO, NEW YORK

HIGGIN
ALL METAL
WEATHER STRIPS



Ordinary single-member strip
Sash grooved for cord

The exclusive Higgin Insert
Strip completes the job

Are you recommending the right weather strips?

The only weatherstrips made with a self-holding spring-flange **Insert** are Higgin All-Metal Weatherstrips.

No window without this **Insert** can be as draft-tight as a Higgin-equipped window. The illustration shows why.

The spring flanges of the **Insert** lightly grip the sides of the raised rib and close the space around the sash at every point. There is no air leakage where the sash is cut out for the cord, nor seepage around the rib when the sash shrinks. The metal-to-metal contact insures a perfect fit and closure; also an easy-sliding sash under all conditions.

A Higgin Installation means added comfort, greater fuel saving, increased satisfaction with the heating system.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All-Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never loose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The HIGGIN Mfg. Co.
Newport, Ky.
Toronto, Canada.
Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens

Buy Direct and get in on a very Profitable Field

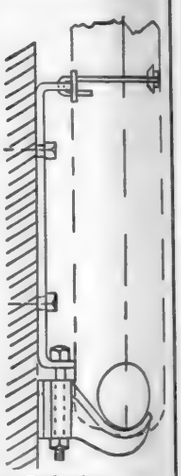
You Can Now Buy C. S. B. APPROVED SPRINKLER HEADS

direct from us, either separately or together with all the other necessary equipment for sprinkler systems. There is a profitable field in your vicinity and you do not have to let this go by any longer. Use your own pipe and men and make your own price. Sprinkler heads must be replaced after a fire. Keep a stock on hand for this demand.

Write for prices. We cooperate with you in every way.

C. S. B. SPRINKLER COMPANY
54 Batterymarch Street **Boston, Mass.**
Factory: Laconia, New Hampshire
Canadian Representatives: L. E. Moulton Co., Inc., 142 Inspector Street, Montreal, Canada

THE GLEOCKLE
Wrought Iron Adjustable
RADIATOR BRACKET



Patented
No. 9 Bracket for Legless Column Radiation

Convenient—Safe—Durable

Used in buildings where the best equipment is specified, and besides being convenient, safe and durable they are easily erected, adjustable, inexpensive, sanitary, and invisible after erection.

FIT ANY MAKE OF WALL RADIATOR

Send for descriptive booklet and trade discount

A. F. GLEOCKLE, Jr.
415 Bay Street, **Rochester, N. Y.**

R E E D A I R I S C L E A N A I R

The above illustrations show Lord & Taylor's store, Fifth Avenue, New York City, and the installation of Reed Air Filters that provides 30,000 cubic feet of clean air a minute for ventilation.

LORD & TAYLOR *Protect* Health and Property with *Reed Air Filters*

The high standards of Lord & Taylor called for excellence of air conditions in their store. It was necessary that the plan of ventilation meet the most stringent requirements of purity to protect customers and employes against the dangers of vitiated air and to safeguard valuable merchandise and handsome interior finishes against the evils of dust and soot. It was therefore logical to select Reed Air Filters to fulfill these requirements. Reed Air Filters remove the greatest volume of dust, soot and bacteria from the air with least resistance to the air flow *and at lowest cost.*

REED AIR FILTER COMPANY, *Incorporated*
215 Central Avenue, Louisville, Ky.
Offices in Principal Cities

REED AIR FILTER COMPANY, Inc.
215 Central Avenue, Louisville, Ky.

Gentlemen: Please send me without obligation the following bulletins:

No. 106—The Reed System of Air Filtration
No. 107—Data, Tests and Specifications
No. 108—Reed Air Filters for General Ventilation

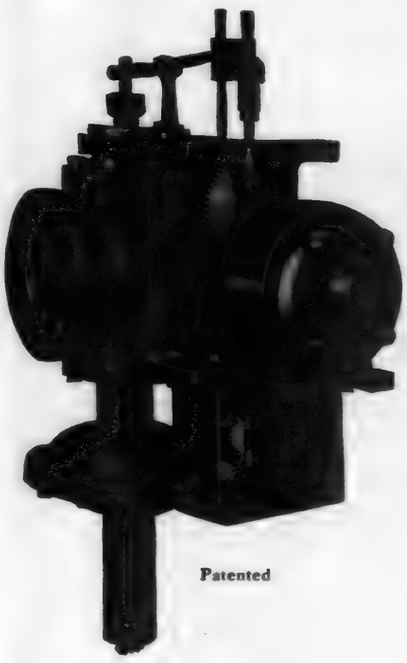
Possible Use ..... C. F. M. Required
Name .....
Address .....

Reed Air

TRADE *filters* ALL METAL MARK

(*REED AIR FILTERS are manufactured under patents of May 16, 1922, Feb. 12, 1924, Nov. 18, 1924. Other patents pending.*)

3190



Patented

"Master Control" Valve

New Thermostat makes possible a simplified construction

The Automatic Switch Control Box is now made a part of the motor bracket unit, because the new Thermostat being suitable for contacting on either 110 or 220 volts direct no low voltage transformer is required.

Armored cable is used to connect thermostat to motor switch, making this installation most desirable in Industrial Buildings, Stores, Offices, Schools, Hospitals, etc.

The method of construction heretofore used will be continued, for use in such places as residences, where the running of armored cable might be less desirable than that of the low voltage thermostat cord.

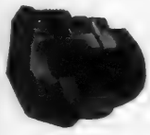
Either style of "Master Control" is sold on a sixty days' trial basis.

Ask for Bulletins and complete information about this efficient heat controlling system.

Heat Loss is Money Loss

Central Heat Appliances, J. C. Hornung Engineer **343 So. Dearborn St., Chicago**

Wonderful Savings in the Cost of Heating are made with Metering Radiator Bushings



Patent Allowed

Let us tell you about the savings the users of this simple device are obtaining.

Used to decided advantage on any return line or vacuum installation. Equally good for correcting installed plants as for plants being installed. A wonderful device for reconstructing extravagant plants at a price that will get the job.

Write for circulars

They are placed in supply end and proportion the steam to each radiator as required.

THE HOLLEY MANUFACTURING COMPANY
529 Seventh St. South, Minneapolis, Minn.

Compare the price

- ☐ Reducing Valves
- ☐ Temperature Regulators
- ☐ Pump Governors
- ☐ Balanced Valves
- ☐ Damper Regulators
- ☐ Float Valves
- ☐ Swing Joint Fittings
- ☐ Bronze Unions
- ☐ Thermostats

Write your name and address on the margin of this page, mail to us, and we will send complete information.

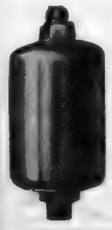
ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.

A Dependable Line of Heating Specialties

Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed a severe experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO



THE PHOENIX
CONSTANT-EFFECT
AIR FILTER

Comprises
4
Important Exclusive Features

1 Unvarying Cleaning Efficiency.

2 Constant Resistance.

3 Self-Cleaning.

4 Minimum Operating Cost.

The Phoenix Air Filter may be successfully applied to any service wherein clean air is required.

DRYING SYSTEMS INC.

11 SOUTH DESPLAINES STREET

CHICAGO

— BRANCH OFFICES —

50 Church Street
New York City

2011 Park Avenue
Detroit, Mich.

257 So. Spring Street
Los Angeles, Cal.

What is

THE PHOENIX CONSTANT-EFFECT AIR FILTER

The Phoenix is an advanced type of viscous film filter developed in Europe and extensively used abroad for all purposes for which an air filter is desirable. It has recently been made available to American users by this Company.

Instead of depending upon an occasional cleaning of the filter medium, the Phoenix is provided with a movable screen which is intermittently passed through an oil bath. A few turns of the handle or the automatic operation of a clock-controlled motor, brings up a fresh filtering surface at predetermined intervals. While the soiled area is passing through the viscous fluid it is thoroughly cleaned, the dust being removed from the screen and allowed to settle in the fluid tank.

1 Unvarying Cleaning Efficiency.

The cleaning action of the Phoenix Air Filter is constant. The curve of its cleaning effect is a straight line, at the point of maximum effectiveness. Therefore, regardless of the varying dust content of the air at different times, and in different locations, the Phoenix Air Filter always operates at maximum effectiveness.

2 Constant Resistance.

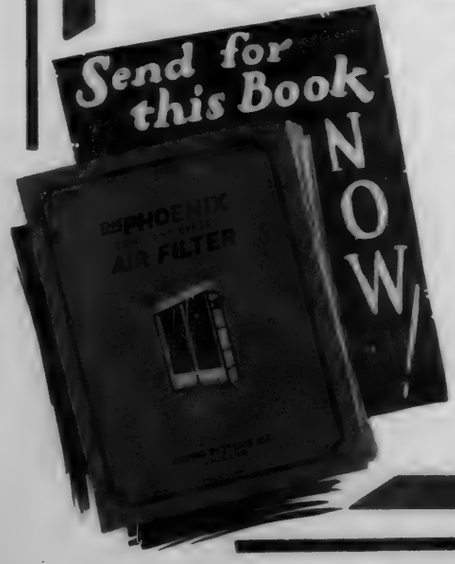
The constant resistance of the Phoenix Air Filter assures the passage of a constant volume of air. This is of utmost importance, since the usefulness of the entire system, whether it be for filtering, cooling, heating, or some other kind of processing, depends primarily upon the actual delivery of the volume of air, for which the system was designed.

3 Self-Cleaning.

The automatic self-cleaning of the Phoenix Air Filter eliminates the undesirable manual labor required by other types of filters and since there is no dependence upon such labor, there is no danger of the entire installation becoming ineffective through neglect or carelessness.

4 Minimum Operating Cost.

Inasmuch as resistance determines the power required by the fan, and since the resistance of a clean filter is less than that of a clogged one, the power required for the operation of a Phoenix installation is always at a minimum. Further, the design of this filter is such that it reduces to a minimum the labor for cleaning and oil consumption required for operation.



A new bulletin fully describing the Phoenix Air Filter and giving detailed dimensions, capacity, etc., is available for the asking. You should have it in your file—a card will bring you a copy.

DRYING SYSTEMS INC.

11 SOUTH DESPLAINES STREET

CHICAGO

Also manufacturers of Air Conditioning, Cooling and Ventilating Equipment; Oil and Fired Air Heaters; Automatic Controlling Devices; Paint, Varnish and Enamel Drying Systems; and Heat Treating Furnaces

Owners
BOARD OF EDUCATION.
Pittsburgh, Pa.

DAVID B. OLIVER HIGH SCHOOL
PITTSBURGH, PA.

Heating Contractor,
R. T. WITHERS SONS CO.
New Castle, Pa.

This Fine New Pittsburgh School Equipped with Buckeye Fans and Buckeye Heatovents

Buckeye Products are the logical choice of a great many engineers and architects for fine buildings such as this, and we are proud to add this new high school building to our long list of installations.

Our equipment, backed by fifty-one years' experience in the heating and ventilating field, is being installed in a large number of both new and old buildings.

The coming vacation period provides an ideal opportunity of replacing your old heating system with the new, modern, economical and health promoting Heatovent System. The Heatovent is very flexible, easy to install, simple to operate, and requires very little floor space. Old buildings in which no means of ventilation have been provided, can be readily and easily equipped with the Heatovent System.

It will pay you to investigate the improved Heatovent System of ventilation and learn its many advantages.

Buckeye Blower Company

Columbus, Ohio

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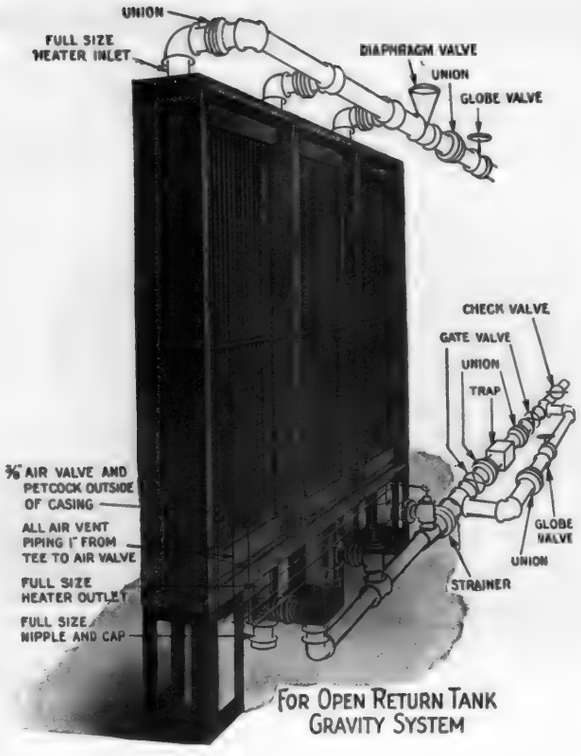
Rose Building, Cleveland, Ohio



FOR OPEN RETURN TANK GRAVITY SYSTEM

AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.
L. C. Soule, *Sec'y and Chief Engineer*

AEROFIN

Fan-System Heating Surface

To Engineers, Architects and Contractors

THE installation of Aerofin with Vertical Tubes is recommended as this arrangement is less subject to errors of installation and operation. **The horizontal tube arrangement** is satisfactory when installed in accordance with our instructions and diagrams.

Since there is no equal to Aerofin, why not specify it outright? Plans and specifications should show sizes and number of units, with piping details.

Aerofin has a tremendous advantage in its light weight. Aerofin weighs only 9% to 25% as much as the old fashioned heavy heaters. **Aerofin saves a great deal of space.**

Aerofin is made of Non-corrosive Metals. This feature meets with universal approval.

Aerofin is very easy to install. Two men can easily handle any **Aerofin** Units without block or tackle. **Aerofin** comes to the job encased and ready for steam connections. Its **unit construction** allows the assembly of several units high or wide by simply bolting through the template-punched flanges. **Aerofin** may be suspended from ceiling with small angles and rods, avoiding the use of platforms. No extra reinforcement of the building construction required with **Aerofin.**

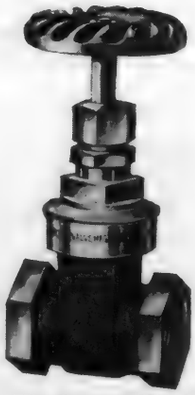
The installed cost of Aerofin is generally less than that of cast iron heaters and pipe coils. **Aerofin** can be erected in the same number of **hours** as is required in **days** to erect the heavy heaters. This means a great saving in erecting cost.

Three years of successful service establishes confidence in the use of **Aerofin.**

Write for catalog, instruction leaflet and service details.

Aerofin Is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

You'll Find—*More Weight Per Dollar*
Better design throughout
in Scott Valves!



The famous No. 1 Bronze Gate Valve—wins by comparison.

There's a heap of satisfaction in putting in valves that last a life time. Scott Valves are over-sized, extra heavy,—so strongly built that after twenty years' service they can be taken apart, repaired and put back on the job as good as new. Measure the 1¼-inch Scott No. 1 Gate for example. You'll find it from 5/16 to ½ inch longer, and from ½ lb. to 1¼ lb. heavier than competitive valves. Moreover, you'll find Scott Valves of superior design and construction—the very best bronze and iron body valves on the market for all plumbing and heating services. For quality and economy recommend and install Scott Valves.

Scott Valve Manufacturing Company
3963 McKinley Avenue **Detroit, Michigan**

SCOTT SINCE 1886 VALVES

SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"

10 Silentvanes

Ventilate Boston's New Chamber of Commerce Building!

Parker, Thomas & Rice, Arch.
French & Hubbard, Eng.
W. M. Evatt Co., Gen. Cont.
Lord Construction Co., Htg. Cont.

Another prominent structure—the New Boston Chamber of Commerce Building—is equipped with Sturtevant Silentvane Fans which furnish proper ventilation throughout this fine building. As an assurance that the air supply would be as pure as possible, Sturtevant Air Washers were installed to thoroughly cleanse the air before it was distributed by the Silentvanes.

Architects and engineers realize the superiority of Silentvanes. These fans have been on the market but three years, yet in this short time over a thousand have been installed, and are meeting the ventilating requirements, of many of the country's prominent buildings, in a most satisfactory manner.

Silentvanes are better because they run more quietly at higher speeds than other types of ventilating fans and develop a maximum efficiency of 83%.

Silentvanes save on power and motor costs. The self-limiting horse power characteristic prevents motor overload and eliminates the necessity of providing a motor rating excessively greater than the fan load requires in operation.

WRITE FOR OUR SILENTVANE BULLETIN 290.

B. F. STURTEVANT COMPANY

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Sturtevant
PUTS AIR TO WORK

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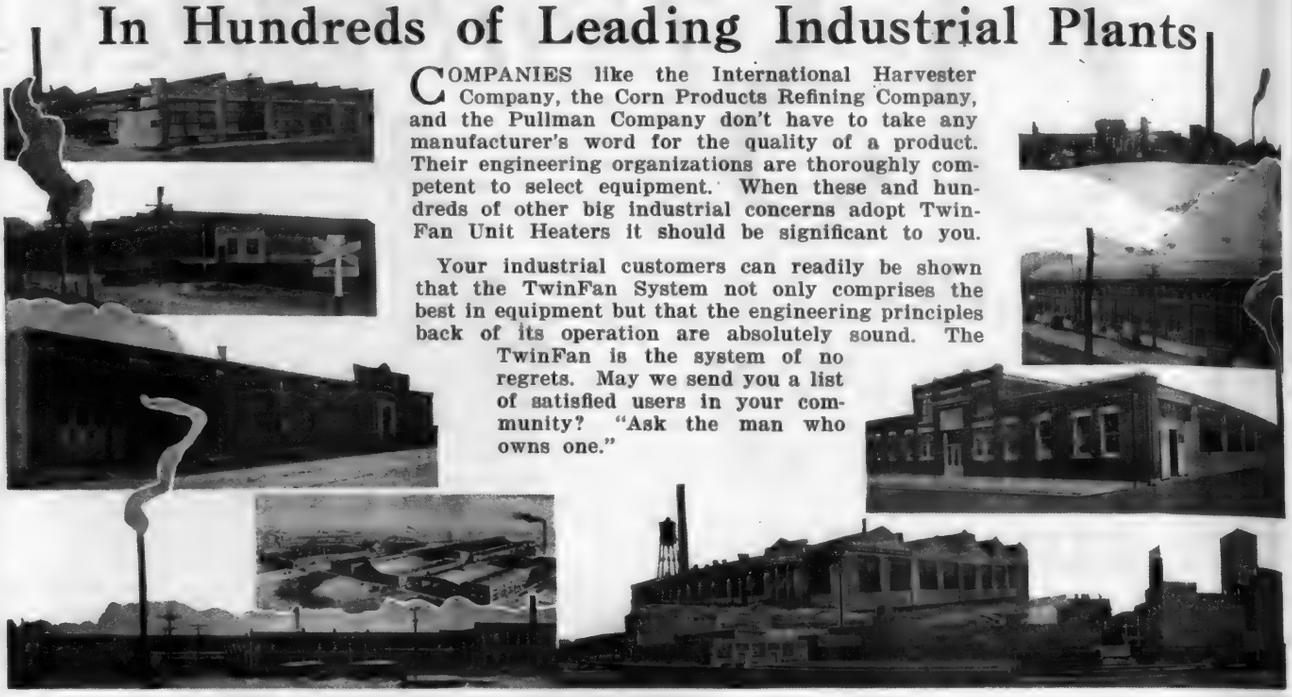
1342

TWINFAN Unit Heaters

In Hundreds of Leading Industrial Plants



COMPANIES like the International Harvester Company, the Corn Products Refining Company, and the Pullman Company don't have to take any manufacturer's word for the quality of a product. Their engineering organizations are thoroughly competent to select equipment. When these and hundreds of other big industrial concerns adopt TwinFan Unit Heaters it should be significant to you.

Your industrial customers can readily be shown that the TwinFan System not only comprises the best in equipment but that the engineering principles back of its operation are absolutely sound. The TwinFan is the system of no regrets. May we send you a list of satisfied users in your community? "Ask the man who owns one."

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

IRON BODY GATE VALVES

SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings

Illinois Malleable Iron Company

1801 Diversey Parkway Chicago, Ill.

The Universal Unit Ventilation System

GUILBERT & BETELLE, *Architects*
Associate Architect
ARNOLD H. MOSES

GLASSBORO STATE NORMAL SCHOOL
GLASSBORO, N. J.

Engineers
R. D. KIMBALL CO.

THIS IS ONE OF MANY TESTIMONIALS FOUND IN OUR INSTALLATION BOOKLET

May We Send You A Copy?

NEW JERSEY STATE NORMAL SCHOOL
GLASSBORO
J. J. SAVITZ, *Principal*

Dear Mr. Nesbitt: February 13, 1924

In reference to your communication I would say that the heating units established in this school by your firm are entirely satisfactory. There is no noise, there is plenty of fresh air, and the rooms are well heated. I am so enthusiastic about your system that I am willing to recommend the installation of this system most heartily and would certainly have it installed in any building I should build.

Yours very truly,
J. J. Savitz

S/B

JOHN J. NESBITT, INC.

213 NORTH VERMONT AVE., ATLANTIC CITY, N. J.

Branch Offices and Representatives

NEW YORK, N. Y.
DENVER, COLO.
MINNEAPOLIS MINN.
PORTLAND, ORE.
SEATTLE, WASH.

SEE OUR CATALOGUE IN SWEETS

It Took 40 Years

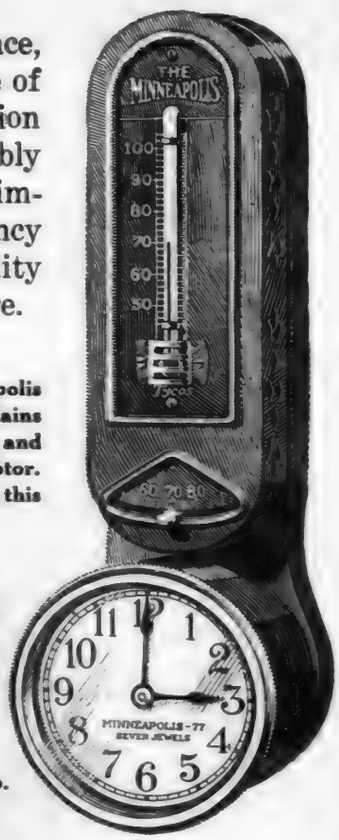
of specialized experience to develop automatic heat regulation to the prefection represented by

THE NEW

MODEL 77

With 8-Day, 7-Jewel Clock

Less experience, less knowledge of heat regulation could not possibly produce such simplicity, efficiency and dependability as you find here.



The new Minneapolis catalog fully explains the new Model 77 and the new electric motor. Let us send you this free book.

Minneapolis Heat Regulator Company

Established 1885

2804 Fourth Ave., So.
Minneapolis, Minn.

The "MINNEAPOLIS" HEAT REGULATOR

TRADE MARK
BRISTOL'S
REG. U.S. PAT. OFFICE

Accurate Record Means Close Control

The closeness with which temperature may be controlled depends first upon the accuracy of the method employed for measuring and recording the temperature.

Bristol Records make possible the closest kind of control for they are accurate.

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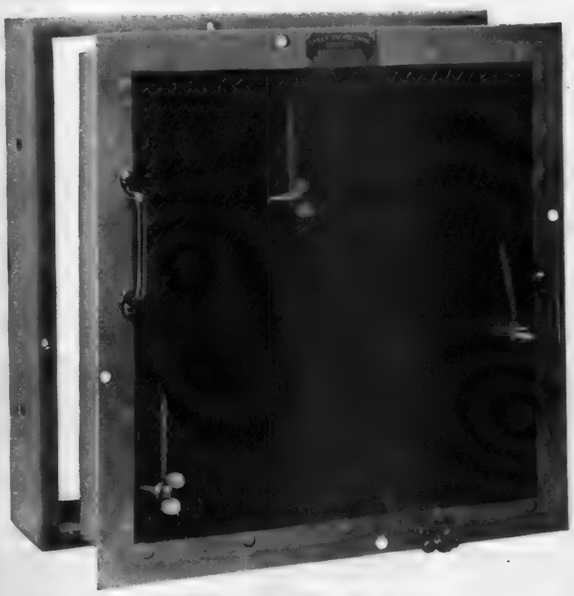
No System of Ventilation is complete without a **Spraco Air Filter,** which is your assurance of **Absolutely Clean Air.**



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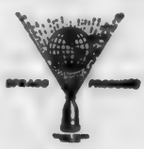

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Ranges from —60° to + 1,000° F.

For temperature of service water, city water, boiler feed water, ventilation air, outside air, heating return, brine lines, etc.

Indicating Pressure Gauge

Ranges from full vacuum to 20,000 lbs. pressure

For water, oil, air, gas and steam lines, pumps, refrigerating machines, heating systems, etc. Designed for lasting accuracy.

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For quick, accurate readings of temperature in water, oil and brine lines and tanks, heating systems, etc. Long distance type—dial can be placed where most convenient.

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For positive, automatic control of humidity plus a permanent record of wet and dry bulb temperatures.

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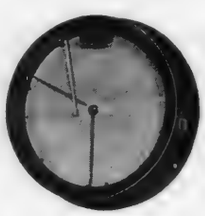
For pressure of city water, compressed air, service water, hydraulic elevators, boiler "blow down," high and low pressure steam returns, boiler steam pressure, heating systems, and steam lines, ammonia in ice machines, etc.



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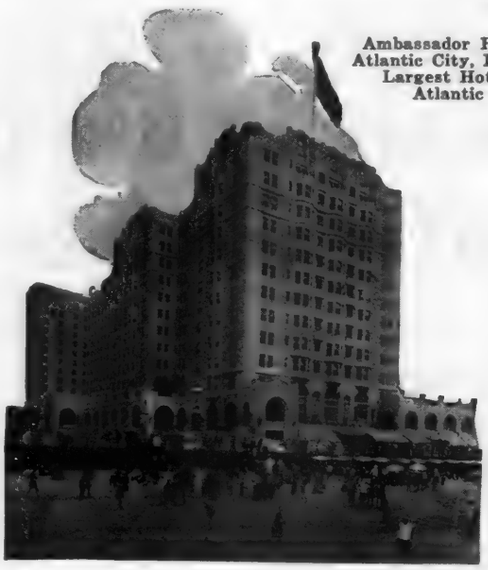

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72 inch	225.00	400.00
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96 inch	325.00	600.00
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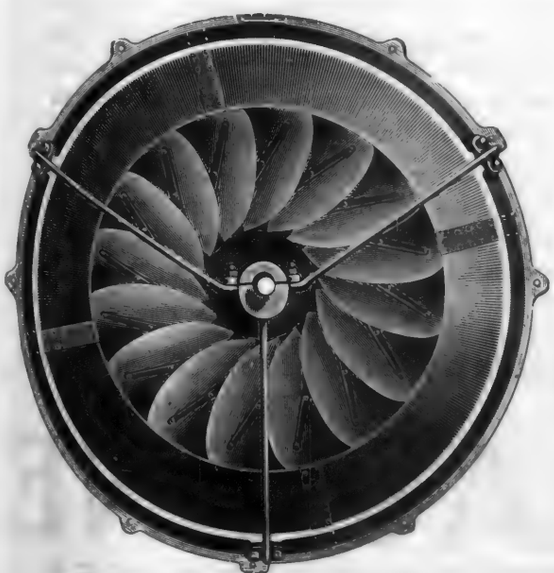

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Put yourself in your customer's place

Fig. 106, screwed, Standard Bronze Globe Valve

As an owner, or as a building superintendent, wouldn't you be apt to hold the heating contractor responsible for the performance of the equipment he installs?

If the job is well installed, and still develops trouble the fault usually lies with the equipment manufacturer. And that's why it behooves the heating contractor to install equipment of *known* worth. *Known* valve equipment means genuine Jenkins Valves. You can install them, and feel sure that they will help to sustain your good reputation by giving reliable service.

Fig. 370, screwed, Standard Bronze Gate Valve

A Jenkins Valve is unaffected by pipe strains, expansions and contraction, lifting and settling. It easily withstands these severe stresses because of its extra sturdiness. The Jenkins "Diamond" signifies a well-built valve, made from analyses - proved metals, carefully manufactured and rigidly tested to allow a wide safety margin.

Fig. 168, Bronze Radiator Angle Valve with male union

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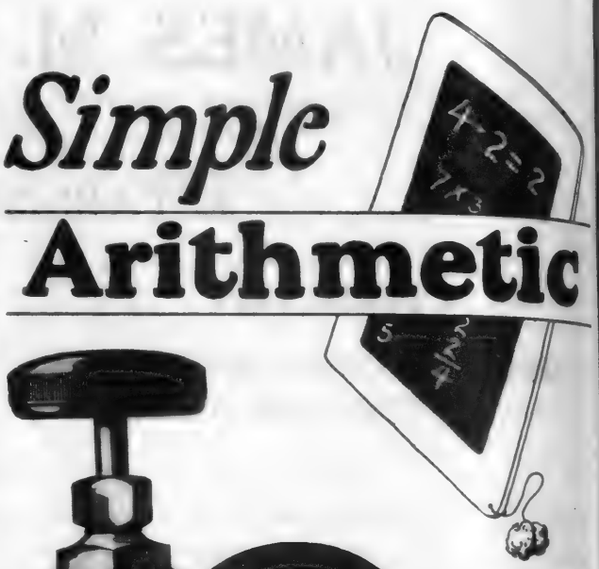
Jenkins Valves

SINCE 1864

Simple Arithmetic



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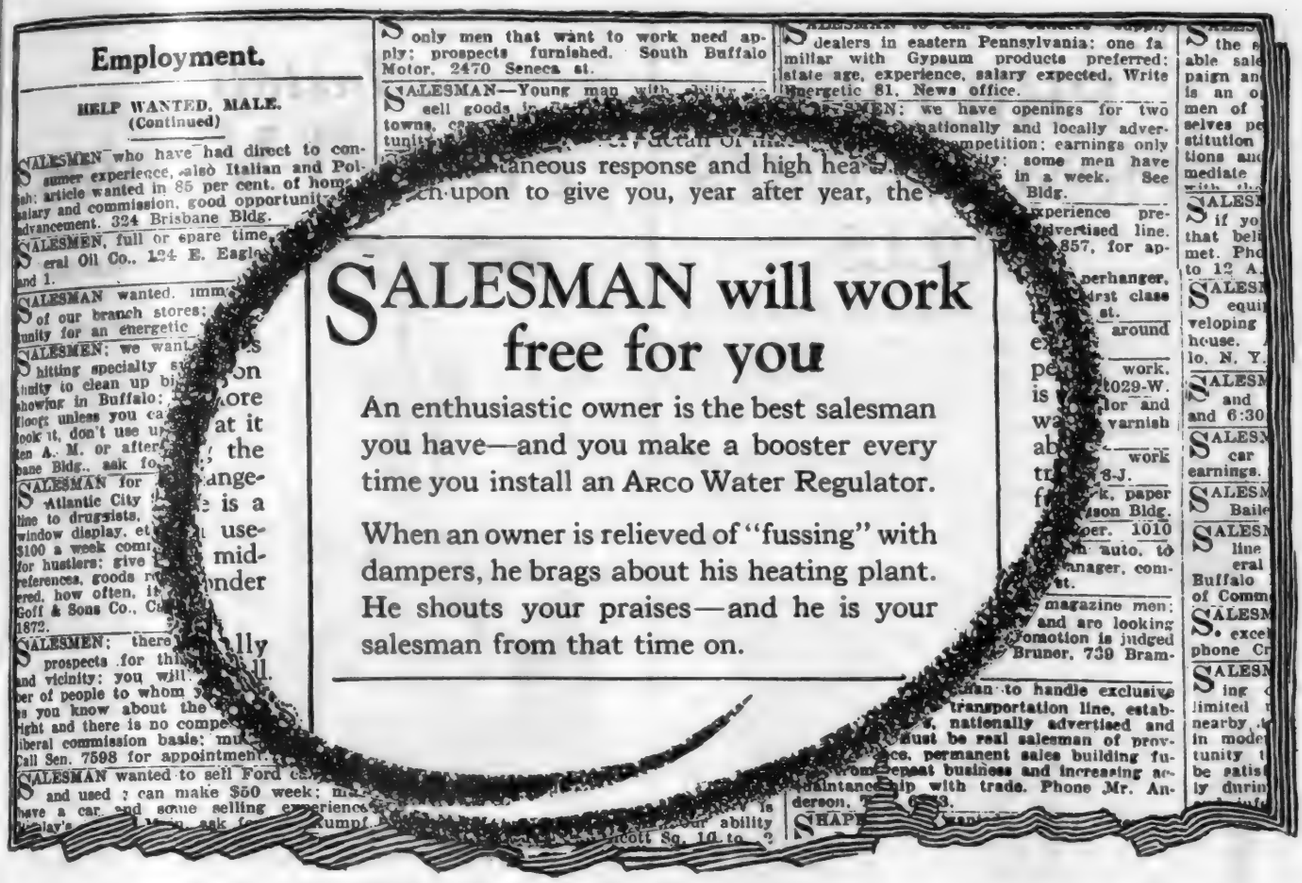
RADIATOR VALVES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SALESMEN; there's prospects for this and vicinity; you will
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SALESMEN; we want
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SALESMEN who have had direct to consumer experience, also Italian and Polish; article wanted in 85 per cent. of homes; salary and commission, good opportunity for advancement. 324 Brisbane Bldg.
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dealers in eastern Pennsylvania: one familiar with Gypsum products preferred; state age, experience, salary expected. Write Energetic 81, News office.
SALESMEN: we have openings for two
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some men have
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Bldg.
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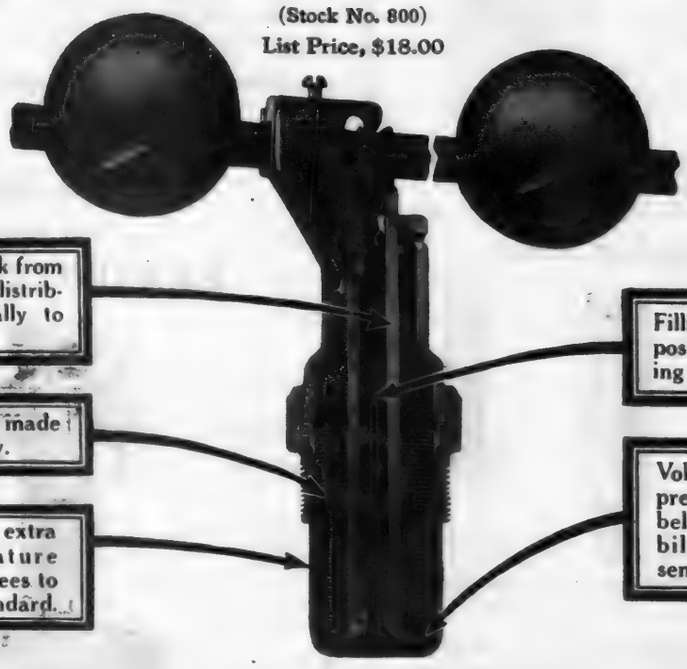
An enthusiastic owner is the best salesman you have—and you make a booster every time you install an ARCO Water Regulator.
When an owner is relieved of "fussing" with dampers, he brags about his heating plant. He shouts your praises—and he is your salesman from that time on.

(Stock No. 800)
List Price, $18.00

For Domestic Supply Boilers
No. 801 Junior Regulator
List Price, $16.00



Stem transfers work from bottom of bellows distributing travel equally to each fold.

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Typical way of drilling holes upward in concrete ceilings and through floors. Also installing Self-Drilling Expansion Bolts.

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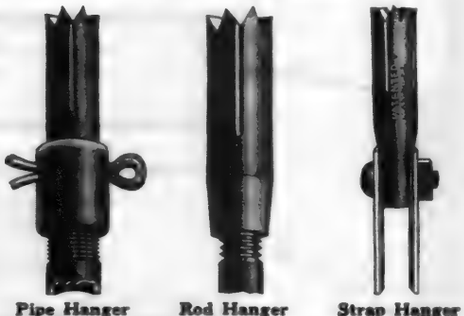

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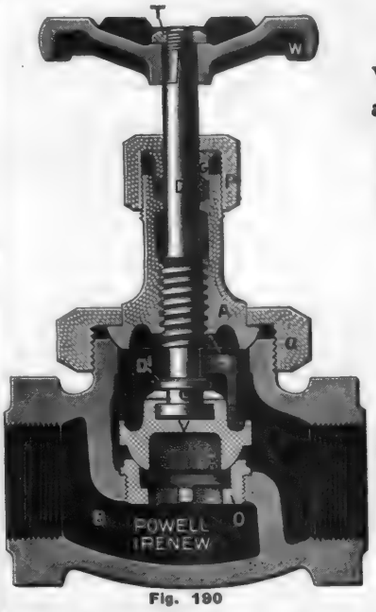

Fig. 190

And Get DEPENDABLE VALVE SERVICE at a minimum cost.

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Iron body brass mounted or all iron.

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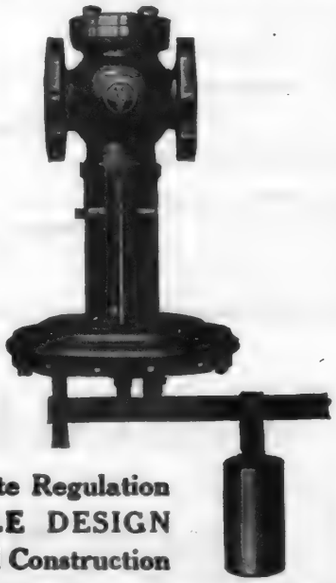

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YOU MAY NOT always find in the Linde books and magazines the help you need in oxy-acetylene welding and cutting. At such times you may need a trained Service Operator to help locate the cause of trouble or to demonstrate the proper methods. Service Operators are a part of Linde Process Service.

If Radiator Manufacturers can use Linde Service, Steamfitters can, too

A manufacturer of radiators asked that a Linde Service Operator make a survey of his plant. Because of his wide experience, the Service Operator was able to suggest many ways of applying the oxy-acetylene process. In the foundry alone, his recommendations made it possible to reduce the monthly loss on rejected castings to 3%, though the previous loss had been 14%.

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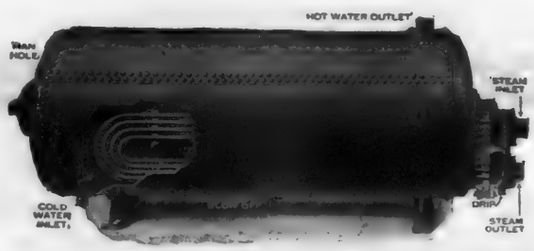
YOU CAN DEPEND ON THE LINDE COMPANY



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Ready for Sudden Heavy Demands

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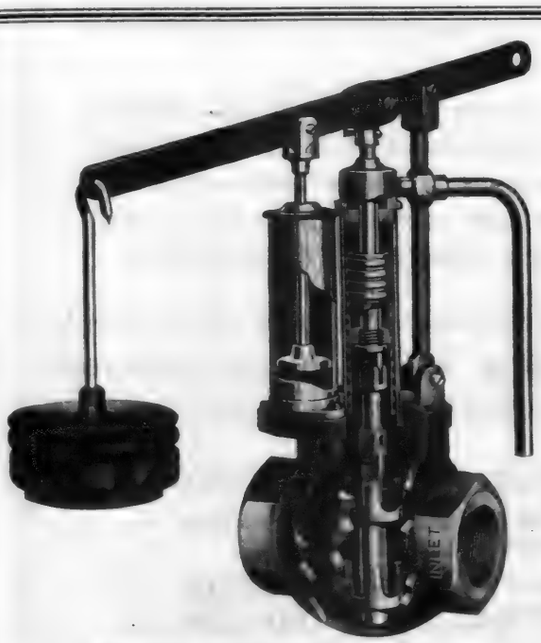
Our Engineering Service is offered without obligation, and the requirements of each installation are considered carefully before making recommendation as to type or capacity of the heater to be used.

Where installations are made in accordance with our recommendations, we positively guarantee satisfactory hot water service.

Patterson-Kelley Co.,

Water Heating Engineers

107 E. 40th St. **New York**



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Made in sizes ¾ to 14 in. inclusive—Std. and Ex. Hvy.
Sizes 1½ in. and under made with brass bodies—screwed ends only.
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KLIPFEL
PRESSURE REGULATORS

Automatically reduce any initial steam, air or water pressure to any desired reduced pressure above 2 lbs.

Maintain reduced pressure constantly regardless of fluctuations in boiler pressure, or changes in the demand for steam.

Simple, rugged and direct acting. As low pressure builds-up and exerts pressure under piston, a balance is formed between low pressure and weighting, which in turn regulates the inner valve opening.

Visible in action. Lever may be used to open, close or test by hand. Position of inner valve may be easily judged by looking at the lever.

Bronze cylinder, multiple grooved piston and balanced plunger type bronze inner valve. All working parts removable while valve body remains in the pipe line.

No troublesome springs, toggles, packing boxes or pilot valves. Dashpot included, which insures steady service pressure and overcomes any tendency of valve to chatter or vibrate.

Guaranteed to closely regulate at maximum steam loads, as the capacity—size for size—is equal to or greater than that of any competing pressure regulator.

We Invite Correspondence.

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Manufacturers of a Complete Line of Steam Specialties including Expanded Outlet Pressure Regulators (Both Piston and Diaphragm Types)—Float Valves—Pump Governors—Back Pressure Valves—Relief Valves—Grease Traps—Steam Traps and many other Specialties.
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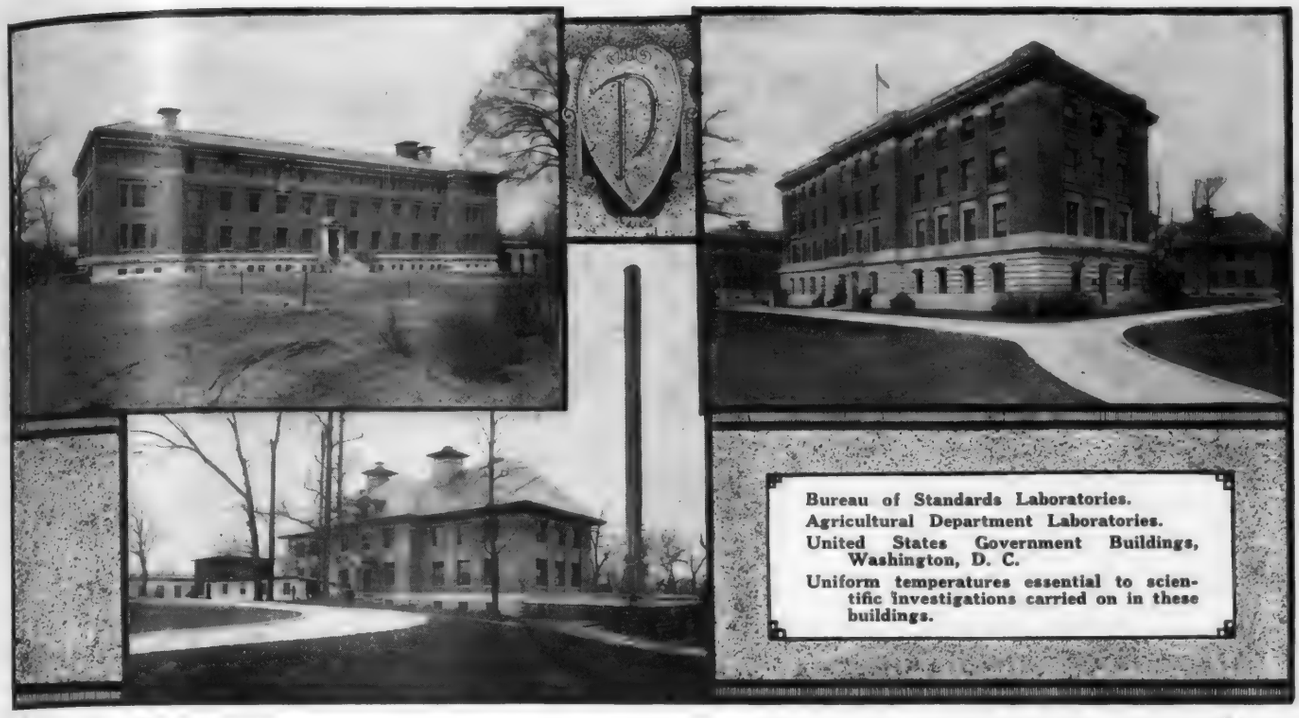
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Uniform temperatures essential to scientific investigations carried on in these buildings.

Performance—not claims—won here

After a thorough investigation the Powers System of Temperature Control was installed in these buildings—the sole determining factor being ACCURACY and DEPENDABILITY of control.

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Excessive use of compressed air in a temperature regulating system introduces large quantities of dust and moisture into the system which results in clogging and corrosion of air lines and mechanism. These troubles, which cause inaccurate control and frequent repairs, are eliminated in the Powers System. It uses 90 per cent less air than other systems. In Powers Thermostats there are no finely restricted air passages or leak ports, no motion multiplying devices which need frequent adjustment and repair.

This is only one of the fundamental differences between Powers systems and Low First Cost Systems of Control and accounts for the practically perfect performance of the Powers System.

The POWERS Thermostat is the secret of the accuracy, dependability and long life of the POWERS System.

Lowest in Cost per Year

A Powers System commonly gives 18 to 25 years of ACCURATE, DEPENDABLE Service, with practically no expense for repairs or adjustments. Our booklet, "The Elimination of Heat Waste" shows how and why Powers Systems are "lowest in cost per year." May we send you a copy?

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34 years of specialization in temperature control

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7—EXCELLENT SERVICE.

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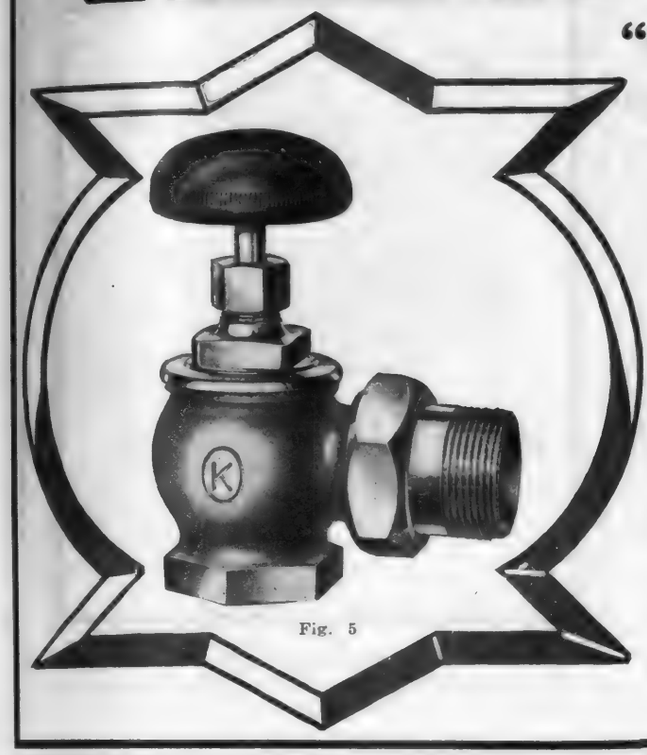

Fig. 5

HERE is illustrated one of the many types of Kennedy Radiator Valves that protect you and your customers by assuring perfect valve service at reasonable cost and with complete absence of operating trouble.

Kennedy Radiator Valves have the finish and lasting reliability of service that provide thorough valve satisfaction. They are made in every desirable type—straightway, angle, offset corner, etc., with or without unions (right or left hand) and with wheel or lock shield and key on operating stem.

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Any heating engineer who is interested in saving coal and getting more heat for himself or for his clients can test the CROWN Fuel Saver at small expense.

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Fits the Feed Door of Any Heating Plant

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No. 1

OUR big country-wide advertising campaign, now appearing in hundreds of local newspapers, is creating thousands of prospects for Thatcher Boilers, Furnaces and Ranges. You can easily turn these prospects into buyers, for we are telling a big part of the "Thatcher Story" for you. This is your big chance to build your business and increase profits by "tying up" with our Advertising and Sales Campaign. Write for full information.

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Formerly Thatcher Furnace Co.
Since 1850

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BOILERS-FURNACES-RANGES

Why Wait *for* Hot Water

When you can have it instantly with

DAHLQUIST AQUATHERM COPPER RANGE BOILER

You can have both an instantaneous water heater and a storage system in one, at slightly more than the cost of a copper boiler alone.

The Dahlquist Aquatherm Copper Range Boiler eliminates waiting for hot water. Can be connected to water back in coal range or ordinary gas heater or any of the usual sources of heat. When hot water is not wanted immediately, the Aquatherm stores it in the range boiler. The action is entirely automatic.

The Dahlquist Aquatherm attachment can also be furnished and installed in any other range boiler now in use.

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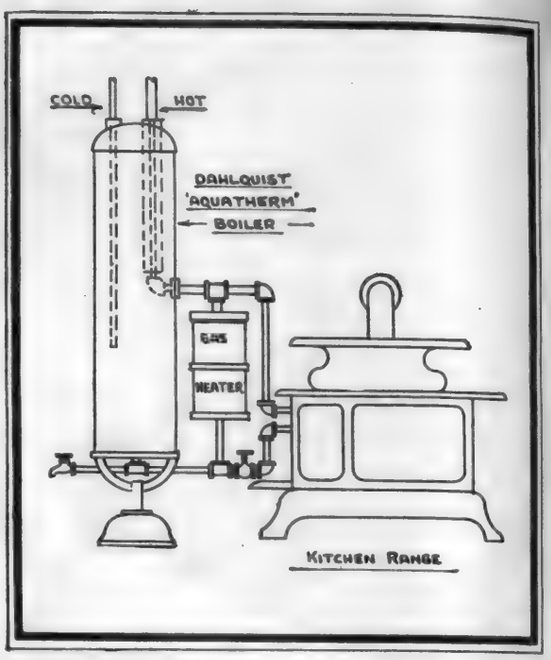

Dahlquist Aquatherm Copper Range Boiler installed in connection with gas tank water heater and water back in coal or wood kitchen range (note the saving of pipe, fittings and labor).

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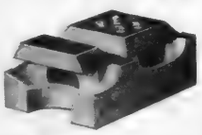
Install **PYRAMID GRATES** and effect a big saving in fuel bills.

Burn Rice Coal at $5.90 a ton.



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Alberger Heaters are known the country over for efficient heat transmission, unusual accessibility and reliable service.

ALBERGER HEATER CO. 291 Chicago St.
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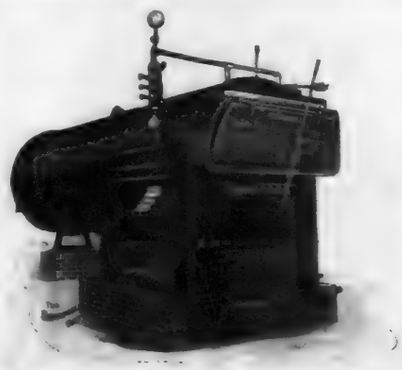

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Better Boilers for Heating and Power Purposes
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BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
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BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

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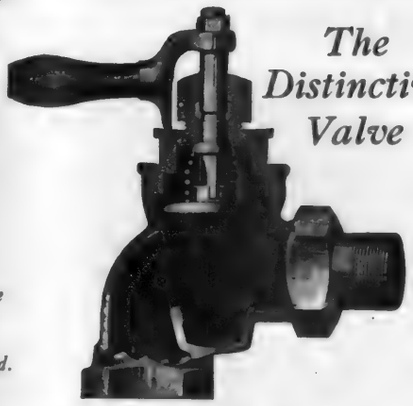
GORTON VALVES



The Distinctive Valve

Complete details gladly furnished.

Some Exclusive Features

One "Quarter Turn" of the handle operates the valve.

The "Packing Lock" eliminates leakage and replacement costs.

The "Full, Unobstructed Path" through the valve eliminates friction, saving energy.

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Established 1887

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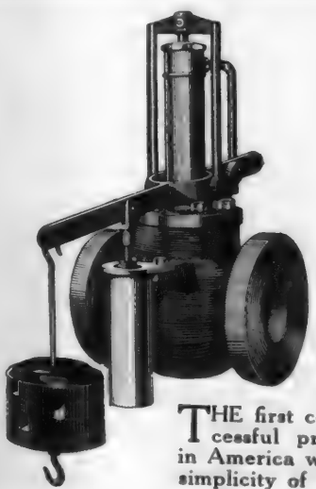

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1875—Valve makers for fifty years—1925

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Reilly Heater

G-R Instantaneous Heater

The Reilly and G-R Instantaneous Heaters have the highest rate of heat transfer of any closed heater on the market. They are in use in thousands of installations where large quantities of hot water are continuously required.

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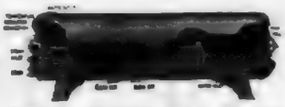

Russell Straight Tube Storage Heater

The G-R U-tube and Straight Tube Storage Heaters are the ideal types where only a limited amount of exhaust steam is available. They can be furnished for any conditions of steam supply and storage requirements.

Combination Storage and Instantaneous Heater

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The G-R Instanta Storage Heater combines all the advantages of both instantaneous and storage heater types without the limitations of either. Its many special features have made it widely popular.

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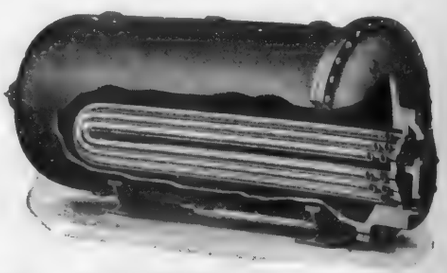
"If There's One Thing I've Learned—

It's how to give 'em a hot water outfit that they'll always O. K. for service, cost and maintenance.

"Install **National Storage Heaters.** No guesswork. No complaints. The job is **right** from start to finish."

Bulletin 65 explains why so many experienced men endorse the National Storage Heater. May we send you a copy?



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STORAGE HEATERS

The National Pipe Bending Company

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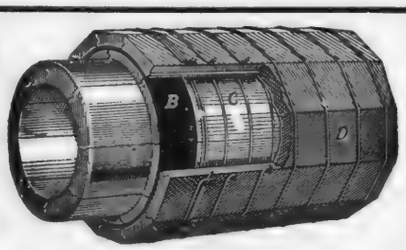
Wyckoff's Improved Cypress Covering



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As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

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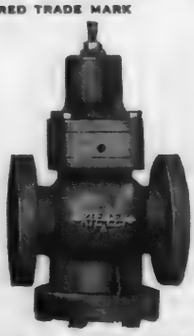

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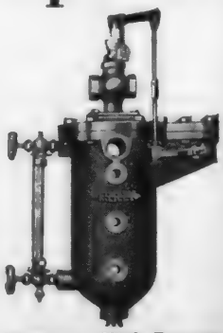

Automatic High Pressure Boiler Water Feeder

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Expansion Joints, Anchors and Guides For Heavy Piping

Diagrams showing correct location of Wheeler-Wainwright Expansion Joints, Anchors and Guides

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to compensate for expansion. Multiple corrugations with internal and external equalizing rings insure long life. Each joint will compensate for 1½ to 2 inches motion.

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to hold the pipe firmly in place. Toothed jaws similar to those on a pipe wrench withstand all forces and prevent slipping.

WHEELER-WAINWRIGHT GUIDES

to support the pipe and guide its movement. The pipe is supported from a roller bearing which allows movement only in the direction of the axis.

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A Trap that works with perfection and eliminates all boiler feed troubles.

Reliable service such as we guarantee protects your boilers against cracked sections, burnouts, etc., by maintaining the proper water line.

Taylor Motor-Driven Automatic, Centrifugal Pumps and Receivers

For low pressure heating systems. Will drain all condensation from heating coils and return condensation back to boiler. Made of gray iron and bronze. Fitted for hot water.

A Quick, Sure and Economical Way to Feed the Boiler. ***Let us send details in full.***

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85 S. Monroe St., Battle Creek, Mich., U. S. A.

"Keeping Others In Hot Water"—

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Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

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A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

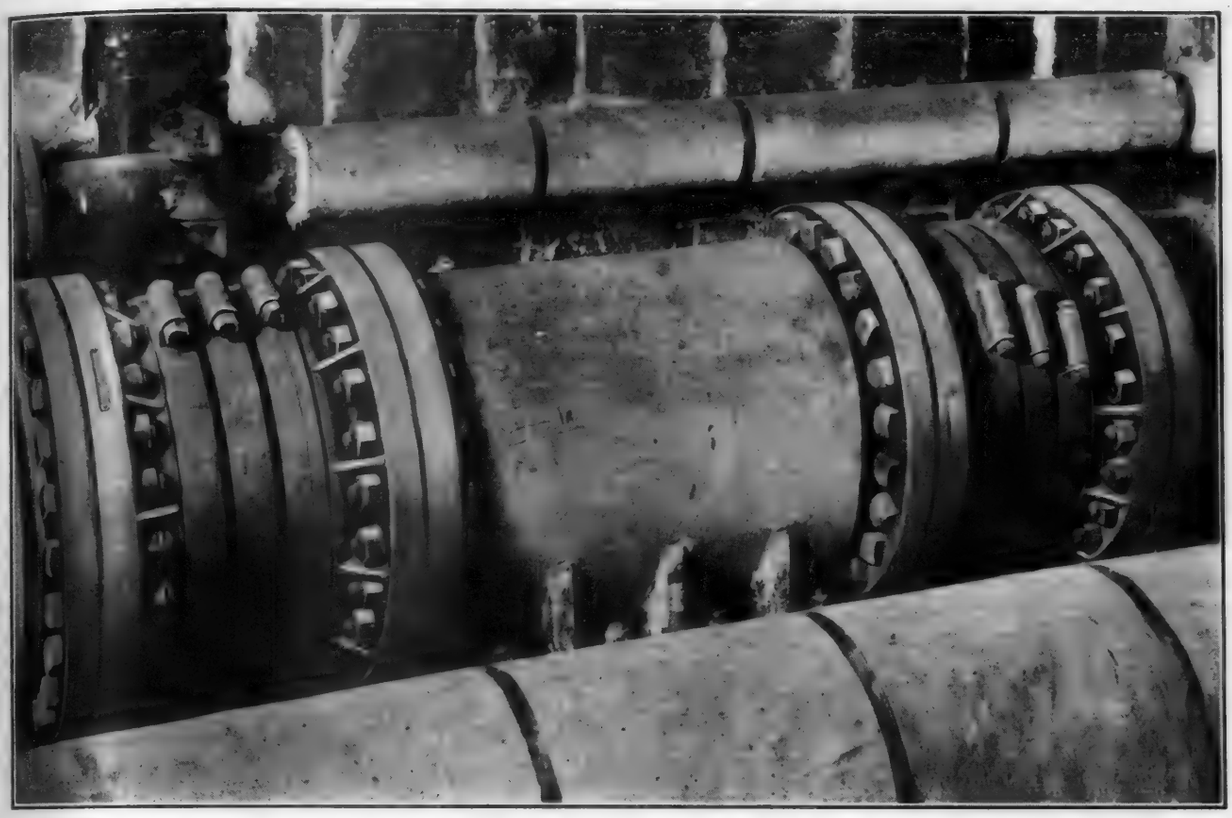
SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.



Corrugation in the one piece, seamless copper expansion element are formed—giving uniform thickness and avoiding weak spots. Exhaustive tests have shown corrugations to be of proper depth.

Compactness—

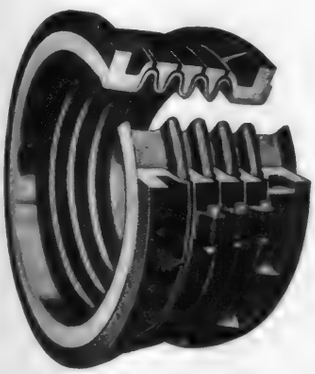
Among the many advantages afforded by BADGER SELF-EQUALIZING EXPANSION JOINTS, and a big factor in their success, is COMPACTNESS. BADGER EXPANSION JOINTS are scarcely any larger than the pipe line itself and can be bolted in place as easily as any flanged fitting.

This means a big saving in excavating costs because there is no extra room needed around the joint itself, and where two or more pipes are run in one trench they can be laid close together, saving room along the entire length of the trench.

BADGER EXPANSION JOINTS, once in place, need no further attention. They are a one-piece joint, have no complicated parts and require no packing.

The seamless, one-piece, copper expansion element is corrugated and prepared in such a way as to enable it to withstand repeated expansion and compression. The iron rings equalize the strain and at the same time add strength to the copper.

Let our engineers tell you more about BADGER SELF-EQUALIZING EXPANSION JOINTS.



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Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F. Hyde Park, Mass.

DUST DETERMINATORS.

Atmospheric Conditioning Corp., Phila., Pa.

ENGINES.

Steam, Automatic.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.

Hoffman Specialty Co., New York.

EVAPORATORS.

Boiler Feed Make-Up.

Badger & Sons Co., E. B., Boston, Mass.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.

Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wright-Austin Co., Detroit, Mich.

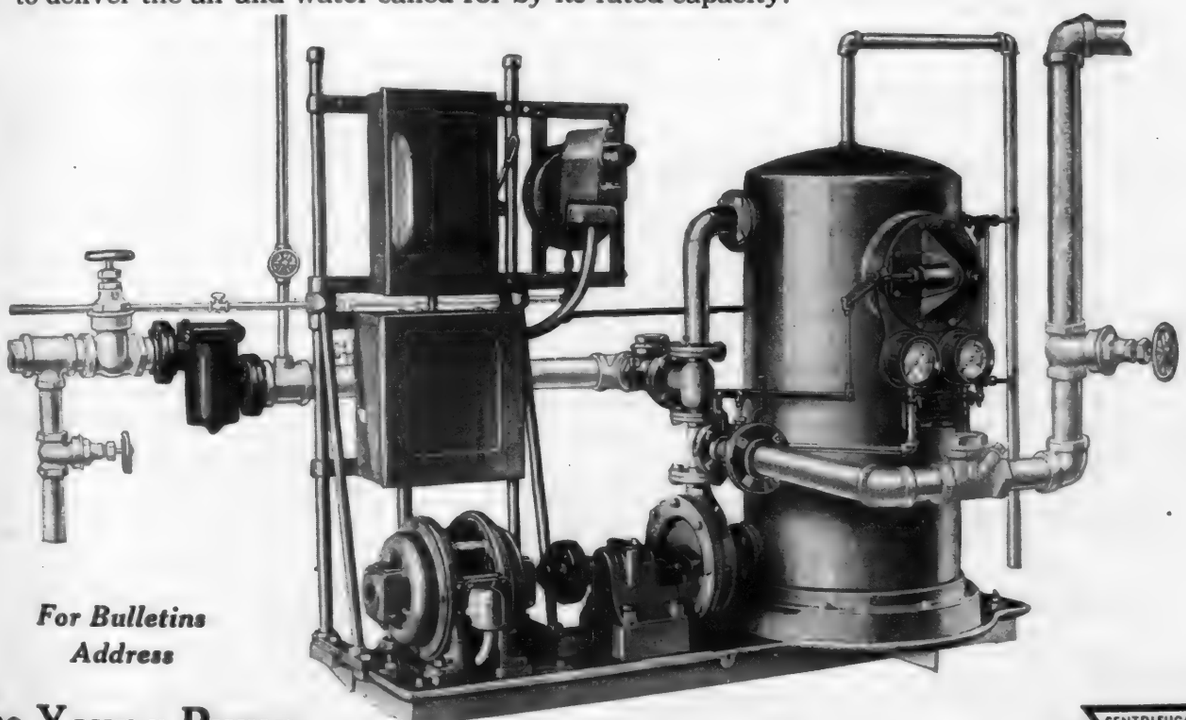
YOUNG

CENTRIFUGAL VACUUM AND BOILER FEED

PUMPS

Completely assembled at the factory and thoroughly tested before shipment, insuring readiness for immediate operation on the job

This assembly and testing assures the unit working correctly the first time the switch is thrown in. You thus know in advance that every part of the pump functions perfectly, that all bearings are properly aligned and that the pump is in mechanical shape to deliver the air and water called for by its rated capacity.



V2 unit equipped for automatic vacuum control, with piping connections made and ready for operation. Piping connections shown in gray tone are to be made by contractor. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

For Bulletins Address

The Young Pump Company
230 East Ohio Street,
CHICAGO

CENTRIFUGAL VACUUM PRESSURE PUMPS

YOUNG PUMP COMPANY

ENGINEERS' SPECIFICATION INDEX (Continued)

EXHAUST SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.

EXPANSION JOINTS.
American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.
Amercan Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

FEEDERS
Boiler
Kieley & Mueller, Inc., New York.
McDonnell & Miller, Chicago, Ill.
Taylor Machine Works, Battle Creek, Mich.

FILTERS, (Aerating).
Griscom-Russell Co., New York.

Feed-Water.
Elliot Co., Jeanette, Pa.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Detroit, Mich.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Altitude.
Pierce, Butler & Pierce Corp., New York.

Draft.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.
American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.
Bishop & Babcock Co., Cleveland, Ohio.

Vacuum.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).
Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Corp., New York.

Water.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Atmospheric Conditioning Corp., Phila., Pa.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES
Dumping
Pyramid Iron Products Co., New York.

Rocking
Pyramid Iron Products Co., New York.

Shaking
Pyramid Iron Products Co., New York.

Shaking and Dumping
Pyramid Iron Products Co., New York.

Shaking, Circular
Pyramid Iron Products Co., New York.

Stationary
Pyramid Iron Products Co., New York.

HEATERS.
Domestic Water.
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Bryant Heater & Mfg. Co., Cleveland, Ohio.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Everhot Heater Co., Detroit, Mich.
Excelso Specialty Works, Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit
Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).
Alberger Heater Co., Buffalo, N. Y.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).
Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.
Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.
Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

Portable Unit Air.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Supreme Heater & Ventilating Corp., St. Louis, Mo.
L. J. Wing Mfg. Co., New York.
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.
"Gasteam".
James B. Clow & Sons, Chicago, Ill.

Vacuum.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gold Car Heating & Lighting Co., Brooklyn, N. Y.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Warm Air
MaGirl Foundry & Furnace Wks., Bloomington, Ill.

Water.
Grinnell Company, Providence, R. I.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila., Pa.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Atmospheric Conditioning Corp., Phila, Pa.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.

YEOMANS

HORIZONTAL AND VERTICAL AUTOMATIC ELECTRIC

Condensation Pumps

A thorough investigation of this pump will reveal the best material, the finest workmanship, resulting in a noiseless, rugged, reliable product that will give dependable service for many years.

For automatically returning condensation to boilers from low pressure gravity steam heating systems.

Also manufacturers of Bilge Pumps, Centrifugal Pumps, Sewage Ejectors, Sewage Pumps, etc.

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Packingless Expansion Joints and other special fittings for underground steam distribution mains.

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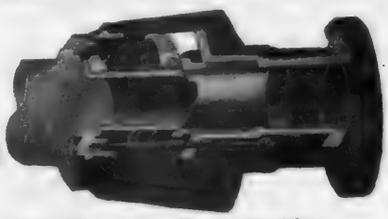
Crosshead-GUIDED Expansion Joint Excels in



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ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.
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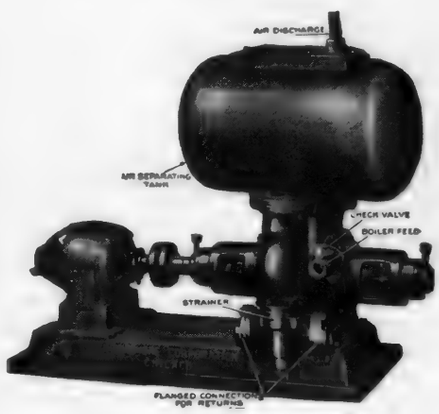
SKIDMORE HYDRO TURBINE VACUUM AND BOILER FEED PUMP



SET THEM AS THEY COME CONNECT RETURNS, WIRE MOTOR AND RUN

Operates on a different principle.

Simple, Efficient and Sure.

Manufactured of highest grade material along lines of best engineering practice.

All parts are accurately machined.

The base, casing, bearing brackets and tank are fine-grained cast iron.

The shaft is Tobin Bronze carried on heavy ball bearings.

The air rotor and centrifugal pump are bronze castings.

The Skidmore occupies half the floor space required for other makes of pumps.

A self-contained unit requiring no piping

Engineers requiring the best and wanting a pump, the high efficiency of which remains constant, should specify the Skidmore.

Bulletin No. 2 will be sent on request.

Built in five sizes for 10 and 20 lbs. pressure to handle 8000, 16000, 26000, 40000, and 65000 sq. ft. of radiation, for continuous service or with automatic control.

SKIDMORE CORPORATION

General Offices and Factory
1535 Dayton St. **CHICAGO, U. S. A.**

ENGINEERS' SPECIFICATION INDEX (Continued)

Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Ric-Wil Co., Cleveland, O.
Union Fibre Co., Winona, Minn.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.

Feed Water.

Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Atmospheric Conditioning Co., Phila., Pa.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNING EQUIPMENT

Johnson Co., S. T., Oakland, Cal.

OZONE APPARATUS.

United States Ozone Co., Scottdale, Pa.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Taylor Machine Works, Battle Creek, Mich.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Elliott Co., Jeannette, Pa.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR BUSHINGS.

Metering.

Holley Engineering Co, Virginia, Minn.

RADIATOR HANGERS.

Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Healy-Ruff Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
Lyon Products Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Wright-Austin Co., Detroit, Mich.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Co., H. W., Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind.
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J.
Elliott Co., Jeannette, Pa.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

SEPARATORS.

Oil.

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SPRAY COOLING SYSTEMS.

Atmospheric Conditioning Corp., Phila., Pa.
Bayley Mfg. Co., Milwaukee, Wis.
Massachusetts Blower Co., Watertown, Mass
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

SPRINKLER HEADS

C. S. B. Sprinkler Co., Boston, Mass.

STRAINERS.

Oil.

Elliott Co., Jeannette, Pa.
Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.

Pipe

Spray Engineering Co., Boston, Mass.

Steam.

American Dist. Steam Co., No. Tonawanda, N. Y.
Dunham Co., C. A., Chicago, Ill.
Eliott Co., Jeannette, Pa.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

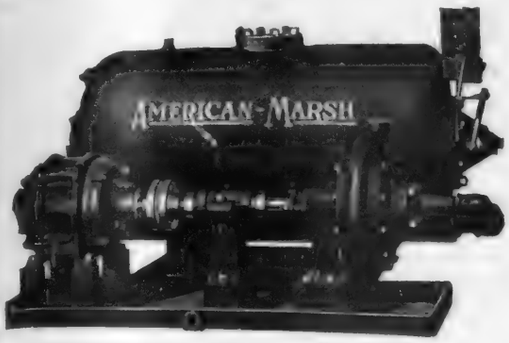
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.



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These endorsements from satisfied users bear irrefutable testimony to the superiority of American-Marsh Line.

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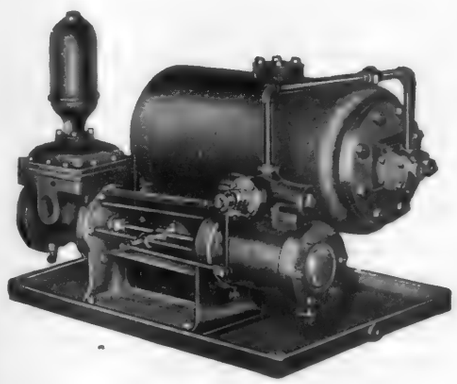

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Hot Water Circulating Pumps
Sump or Bilge Pumps
Condensation Pumps, steam and motor driven, vertical and horizontal.
Automatic Boiler Feed Pumps and Receivers.

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AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN

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HIGH QUALITY at a REASONABLE COST

"SURE RETURN" CONDENSATION PUMP
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The best workmanship and finest materials obtainable are used in building "Sure Return" Condensation and "L-1" Bilge Pumps — yet we are able to sell them at very low prices.

Hundreds of each size are put through our modern shop at one time—but each unit gets individual care and inspection. Thus you are assured of a reasonably-priced, proper working outfit.

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"L-1" BILGE PUMP
Ask for Bulletin 48

CHICAGO PUMP CO.

2332 Wolfram Street **Chicago, Ill.**

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Thrush & Co., H. A., Peru, Ind.

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Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O.
H. W. Nelson Co., Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Elliott Co., Jeannette, Pa.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
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Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.

American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y.

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.

Elliott Co., Jeannette, Pa.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.

American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Globe, Angle and Cross.

Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.

Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.
Klippel Mfg. Co., Chicago, Ill.

Non-Return.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn, N. Y.
Gorton & Lidgerwood Co., New York.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.

Regulating.

American District Steam Co., No. Tonawanda, N. Y.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.

(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Peerless Unit Ventilating Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park. Mass.

(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila, Pa.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
H. W. Nelson Co., Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilating Co., New York.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.

VENTILATORS.

Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Mushroom.

Knowles Mushroom Ventilator Co., New York.
Lyon Products Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

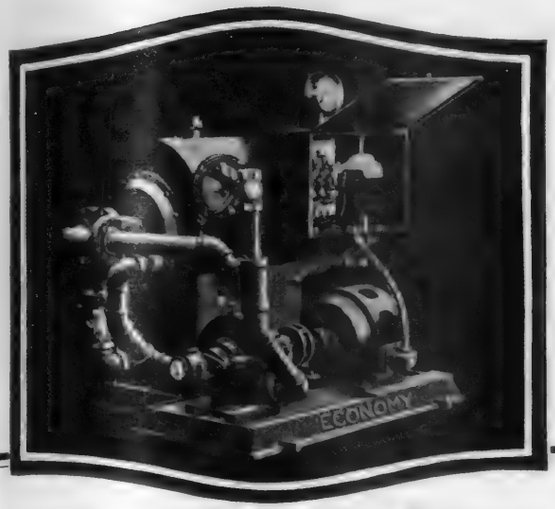
WEATHER STRIPS.

Metal.

Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.
Monarch Metal Products Co., St. Louis, Mo.

WELDING MATERIALS.

Linde Air Products Co., New York.
Oxweld Acetylene Co., Long Island City, N. Y.
Prest-O-Lite Co., Inc., New York.



Type C. V. Fig. 2234—Single Model Vacuum Pumps

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This is an essential requirement of all apparatus entering into the equipment of every worth while project.

Economy Centrifugal Vacuum Pumps

embody every requisite of high class equipment. They are well motored with ample reserve power. They never burn out, consequently shut downs are avoided.

They have ample air, water and pressure capacity.

They have longer life than other types.

They maintain their efficiencies.

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They reduce noise in radiators and piping.

They operate quietly.

They use no more power than other pumps that do the same work.

They are guaranteed for performance and quality.

Representatives in Every Large City

Economy Pumping Machinery Co.

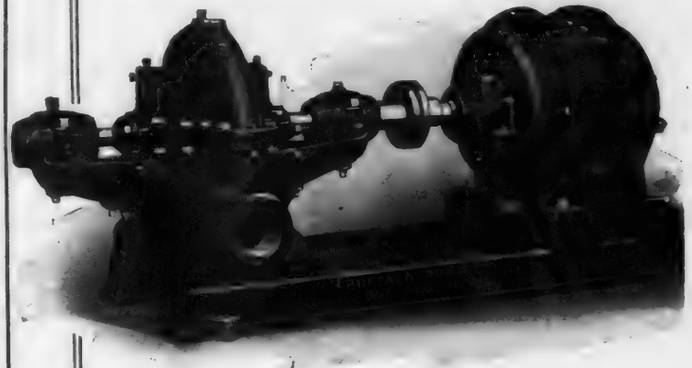
71-122 North Curtis St. CHICAGO

"Buffalo" Class "S" Pumps Stay on the job

Air washer manufacturers and heating contractors use more Buffalo Class "S" pumps than any other make.

This is because they have found Buffalo Pumps "long-lived" as well as efficient.

This popularity has enabled us to reach a production large enough to make the price of Class "S" pumps surprisingly low.



1. **Casing: Horizontally divided; mounted directly on base. Interior can be inspected without breaking pipe connections.**
2. **Impeller: Enclosed double suction type, hydraulically balanced.**
3. **Clearance Rings: Brass. Furnished in casing. Easily renewable.**
4. **Shaft Bearings: Ring oiling, horizontally split housings. Brackets bolted to casing, one on each side.**
5. **Thrust Bearings: Collars in each bearing of smaller pumps, marine type on larger sizes.**
6. **Stuffing Boxes: Extra deep. Brass bushed in smaller sizes.**
7. **Glands: Bolted type.**
8. **Water Seals: Brass. Furnished in each stuffing box. Connections cast in casing in smaller sizes.**

We are glad to have you compare specifications of Buffalo Pumps with any others.

Why not find out more about these pumps? Bulletins on request.

Buffalo Steam Pump Company

480 Broadway BUFFALO, N. Y.

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Save Coal—Prevent Condensation

Insulate All Roofs

To the left: Boulevard Presbyterian Church, Cleveland, Ohio, **insulated** with **FIBROFELT.**
Architect: W. H. Nickles, Cleveland, Ohio.
Contractor: Phillip Kitzer, Cleveland, Ohio.

ALWAYS USE INTERNAL CONDUCTIVITIES, not air to air conductivities when figuring proper thickness for roof insulation. ASK US WHY?

Union Fibre Co., Inc.

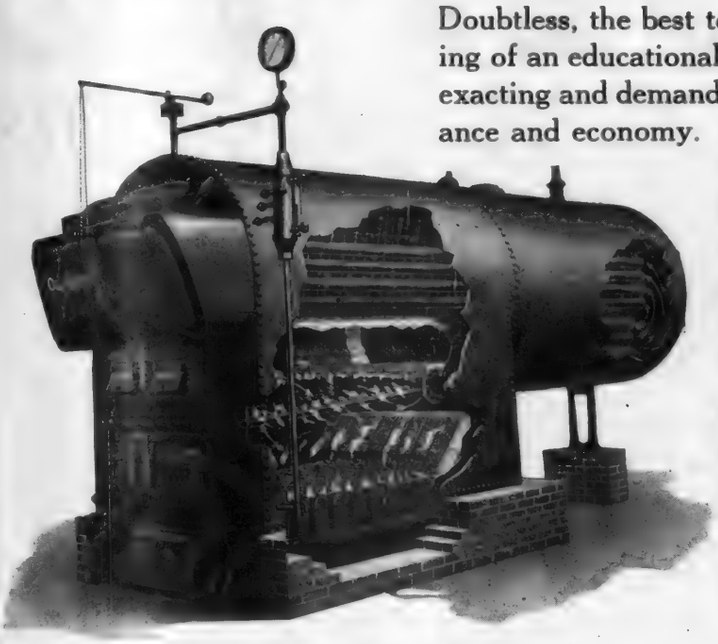
Engineers and Manufacturers

WINONA, MINN.

SALES OFFICES IN

Albany, Amarillo, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Casper, Charlotte, Chicago, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Evansville, Houston, Indianapolis, Jackson, Kansas City, Little Rock, Louisville, Los Angeles, Lynchburg, Memphis, Milwaukee, Minneapolis, Muskogee, Nashville, New York, Omaha, Orlando, Philadelphia, Pittsburgh, Richmond, Rochester, St. Louis, Salt Lake City, San Antonio, San Francisco, Seattle, South Bend, Spokane, Tacoma, Toledo, Toronto, Tulsa, Waco, Wichita, West Orange

Evidence of Boiler Efficiency



Built of Steel, in Accordance with the A. S. M. E. Code

Doubtless, the best test of Boiler Efficiency is in the heating of an educational building, where the requirements are exacting and demand strict compliance both as to performance and economy.

The widespread preference for Oil City Boilers by the educational institutions of the country is evidence of confidence in Oil City service. This same nation-wide confidence prevails in industry.

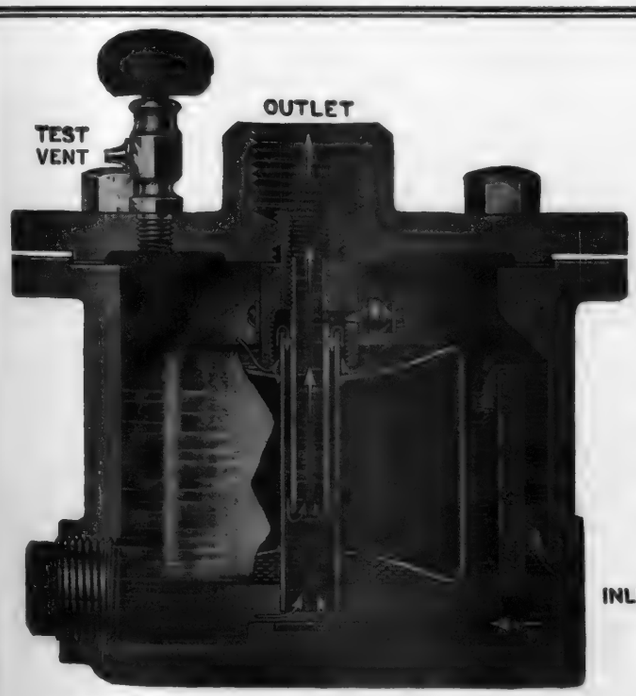
Get the facts about Oil City Boilers and you will know why they are preferred.

Let us send Catalog H-9

OIL CITY BOILER WORKS

OIL CITY, PA.

NEW YORK CHICAGO PITTSBURGH ATLANTA PHILADELPHIA LOS ANGELES



MARSH

DUPLEX WATER SEAL LOW PRESSURE

BLAST TRAP

for direct or indirect coils or any location where large quantities of water are to be discharged

Operates automatically either with or without mechanical suction on return line.

No complicated parts to stick or get out of order.

No small openings to clog up with sediment or scale.

Free passage of water—rapid and steady vent of air and passes no steam.

Combined action of flotation for water and all metal thermostatic vent for air together with relief of air through water seal makes the ideal trap for heavy service.

Adjusted and tested at factory and shipped ready for installation, to work automatically from below atmosphere on up to 25 pounds steam pressure.

We Invite Correspondence

JAS. P. MARSH & CO., 118-124 South Clinton Street, Chicago

FOUNDED 1865

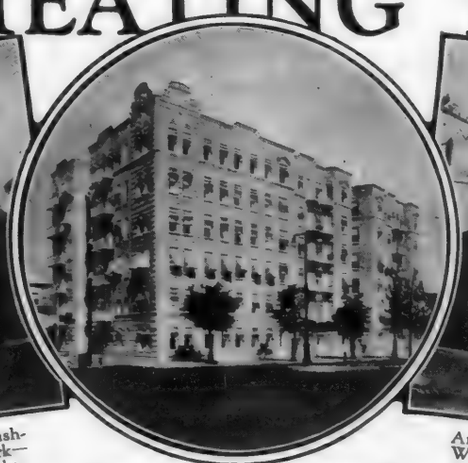
Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents Indicating and Recording Gauges

Agents for Great Britain and Ireland: Chatterton & Co., 30 Fetter Lane, E. C. 4, London
Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario

PACIFIC

STEEL HEATING BOILERS

Georgian Court Apartment, S. E. Cor. Bushwick Ave. & Gates, Brooklyn, New York—Owner, Hicklow Construction Co.—Archt., Wm. Hohauser—Htg. Contr. Dierks Heating Company—One 7500′ Pacific.



Apartment, Cor. Grand Concourse & Bedford Park Blvd., New York—Owner, Jas. Carey & Henry Schreibert—Archt., John P. Boyland—Htg. Contr., Chas. Schneider—One 11,500′ Pacific.

Ambassador Court Apartment located at N. W. Cor. Albany & Crown St., Brooklyn, N.Y. —Owner, Shampan & Shampan—Archt., Shampan & Shampan—Htg. Contr. Frankfort Heating Company—One 8500′ Pacific.

New York is Using Pacific Boilers

Tenants demand heat, not excuses. They simply won't stay if they don't get heating comfort. But, maintaining proper temperatures with ordinary heating equipment is costly.

Pacific Boilers solve this problem completely. They are conservatively rated, have great over-load capacity. Larger combustion space and greater direct heating surface insure maximum heat from the fuel consumed. Consequently lower fuel bills.

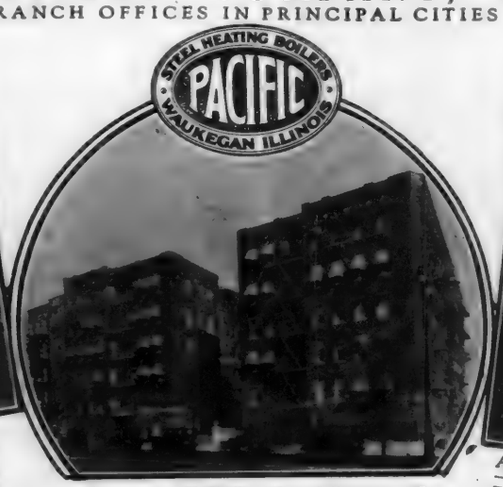
Here are shown a few of the many New York and Brooklyn apartments in which Pacific Boilers have been installed and Pacific Boilers are being installed in similar buildings in all parts of the country. Lets us fully explain the reasons.

Write for complete information today

GENERAL BOILERS COMPANY, *Waukegan, Ill.*

BRANCH OFFICES IN PRINCIPAL CITIES

Apartment, 21st Ave., 78th to 79th St., Brooklyn, New York—Owner, Frank Kufetz—Archt., Sam'l Kaplan—Htg. Contr., Jarcho Bros.—One 5500′ Pacific.



Apartment, N. E. Cor. Grand Concourse & 173rd, N.Y.—Owner, Gordon & Cohen—Htg. Contr., Jas. McGuire—One 13,000′ Pacific.

Apartment, 59 E. 54th St., New York—Owner, French & Co.—Archt., French & Co.—Htg. Contr., W. G. Cornell Co.—Two 7000′ Pacifics.

Why are KEWANEE FIREBOX BOILERS selected for heating finer buildings?

Third

BECAUSE they are Safe.

And

their ruggedness is proved from the records of every Boiler Insurance Company in the country.

MARQUETTE UNIVERSITY
11th and Grand Ave., Milwaukee, Wis.
Two No. 324 Portable Smokeless Boilers

KEWANEE BOILER COMPANY

KEWANEE, ILLINOIS

Atlanta	Chicago	Denver	Indianapolis	Minneapolis	Salt Lake City
Birmingham	Cincinnati	Des Moines	Kansas City	New York City	San Antonio
Boston	Cleveland	Detroit	Los Angeles	Philadelphia	San Francisco
Charlotte, N. C.	Columbus	El Paso	Memphis	Pittsburgh	Seattle
Chattanooga	Dallas	Grand Rapids	Milwaukee	St. Louis	Spokane
					Toledo

Dominion Kewanee Boiler Company, Ltd., Toronto, Ont.

Gurney

Sectional Boilers
Another Type of the 900 Series Steam and Water

No. 925 STEAM BOILER
Also for Water

The wide variance in sizes of the 900 Series of Gurney Sectional Boilers provides a type for every requirement, from the residence to the large installation requiring a battery of two or more boilers.

Another type of this Series is the No. 925 Steam Boiler (also for Water), slightly smaller than the 935 type, and being only 55 inches high, with a grate area of 6½ sq. ft. The same low water line meets requirements where head room is limited.

Gurney Sectional Boilers are built of highest grade pig iron, give long and continuous service and embody many exclusive advantages. Heating surfaces are well arranged, and cleaning is a simple matter. Steam boilers have liberal steam space.

Ample fuel and grate areas, large prime fire surfaces and unusual coal carrying capacity are features which help to make Gurney Sectional Boilers economical and satisfactory.

SEND FOR CATALOG

GURNEY HEATER M'F'G COMPANY.

General Offices:

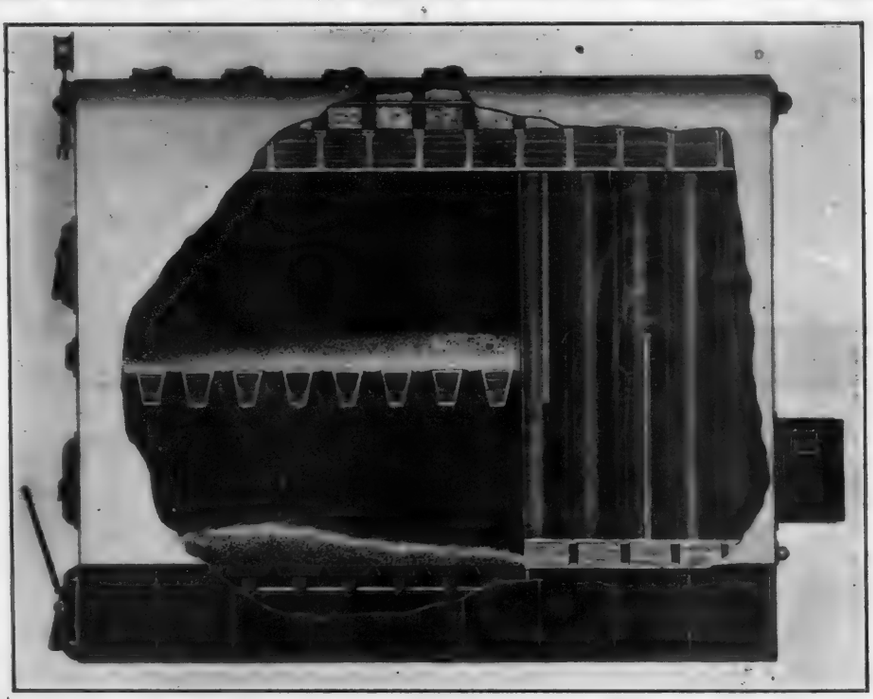
New York
Manly St., cor. Anable Ave., Long Island City.

Boston, Mass.
93-95 Oliver St., Fort Hill Square

Philadelphia
108 North 17th Street

UNIVERSAL SMOKELESS BOILERS

No tile, brick or hot plates to burn out. No return flues. No cement between sections to fall out, which causes a return flue boiler to by-pass. Our boilers should last a life time without spending one cent for repairs.



100% water-tube practically self-cleaning.

Liberal heating surfaces on account of strictly water-tube sections in rear of fire-box.

Universal Double-Grate, Down-Draft Smokeless Boiler in Operation

Note the battery of vertical water tubes directly in the rear of the fire-box, where they are exposed to the most intense heat generated. These tubes are practically self-cleaning.
It is only necessary to clean out the accumulated soot two or three times a year.

UNIVERSAL SMOKELESS BOILER COMPANY, Ravenna, Ohio

Chicago Building Owners have put their "OK" on

WOLFF DRAFT CONDITIONERS

Year	No. Installed
1915	49
1916	95
1917	116
1918	201
1919	383
1920	549
1921	729
1922	932
1923	1004
1924	1201
Total	5259

Among these 5259 buildings which have equipped their heating plants with Wolff Draft Conditioners are many of the *finest buildings in Chicago*—big apartments, apartment hotels, churches, business buildings, warehouses.

Many building owners and operators have installed them in **every building they own.** Could any one ask for a more hearty endorsement?

No matter how fine a boiler may be it can't be operated economically if the draft is not properly regulated. Wolff Draft Conditioners *practically eliminate the human element from the firing of a boiler.* They make it possible for even an unskilled man to get almost perfect results—and with less care.

Hence: **They save fuel,** whether it is coal or oil. The saving is so apparent that we have sold them on a positive guarantee to save from 15 to 35% of the fuel. *And they have made good.*

Also: **They improve heating conditions by keeping more uniform heat throughout the building.** Tenants are not roasted one minute and frozen the next, because Wolff Draft Conditioners make it possible for a boiler to provide a steady even flow of heat—even when the janitor is absent. Dare us to prove these things to you!

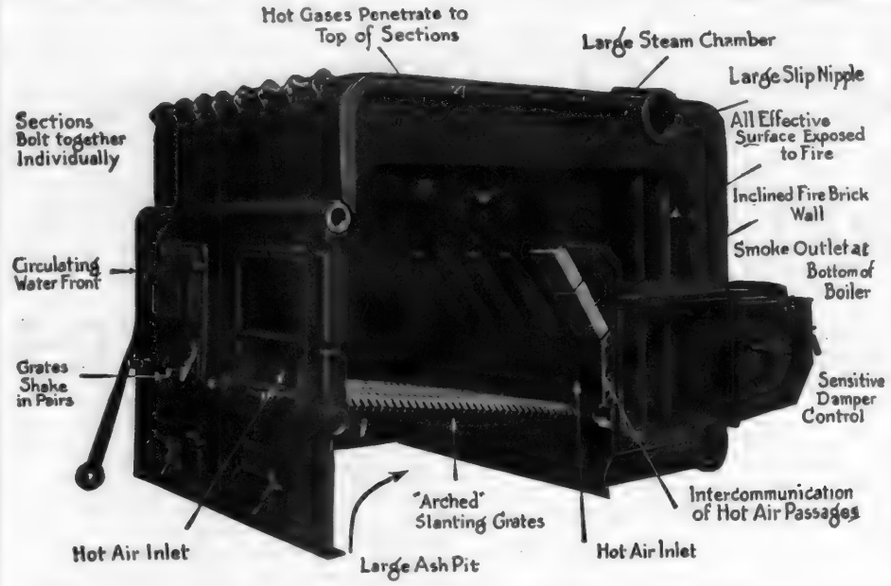
Heating Contractors

Every heating contractor can make money selling and installing Wolff Draft Conditioners. And when you install them on a boiler you can know that boiler will be operated properly, even if it is fired by an unskilled man.

Wolff Draft Conditioners take the "guess" out of firing a boiler, and help it make more heat with less fuel.

Wolff Coal Saver Co.

1336 West Congress St., Chicago


Hot Gases Penetrate to Top of Sections
Large Steam Chamber
Large Slip Nipple
All Effective Surface Exposed to Fire
Inclined Fire Brick Wall
Smoke Outlet at Bottom of Boiler
Sensitive Damper Control
Intercommunication of Hot Air Passages
Hot Air Inlet
Large Ash Pit
"Arched" Slanting Grates
Hot Air Inlet
Grates Shake in Pairs
Circulating Water Front
Sections Bolt together Individually

Ask Us Why You Should Sell It?

You are offering to your customer a very definite article—heat.

He comes to you not for a boiler alone, but for a complete, efficient, and economical solution of his heating problem.

His satisfaction with your service depends on the amount of heat delivered, a low cost of installation and operation, the adaptability and convenience of the means employed.

You can furnish it all at a fair profit—each sale building up accumulated good-will.

NIAGARA RADIATOR & BOILER COMPANY

General Office and Factory—North Tonawanda, N. Y. Branch Office and Factory—Chicago, Ill.

NIAGARA LOW WATER LINE SMOKELESS BOILERS

INSTANT HOT WATER

WITH

DAHLQUIST AQUATHERM COPPER RANGE BOILER

The first improvement in range boiler construction in many years provides instant hot water to the consumer at minimum cost.

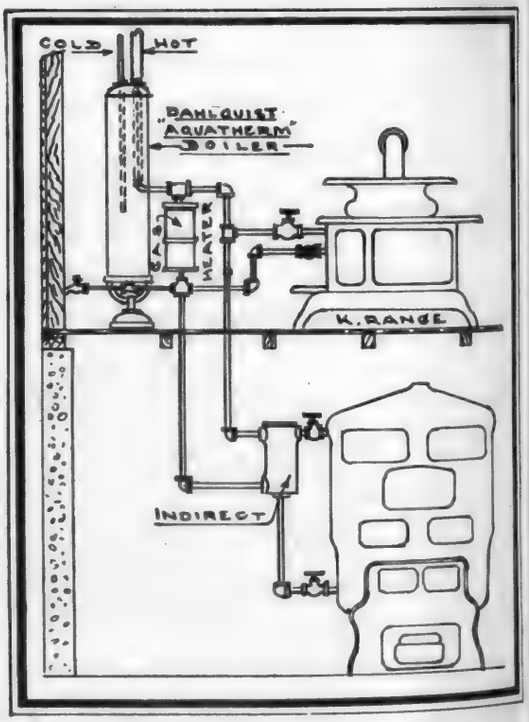
The Dahlquist Aquatherm Copper Range Boiler will reduce by one-half the cost of installing a gas tank heater on any job and will provide all the convenience of an instantaneous heater either from the ordinary gas tank heater, water back in coal range, indirect heater or coil in boiler or furnace, or electric heater. Range boiler acts as storage heater when hot water is not being used.

The Dahlquist Aquatherm can also be furnished separately to be installed in range boiler now in use whether heated by gas, coal, wood or electricity.

Let us send full details

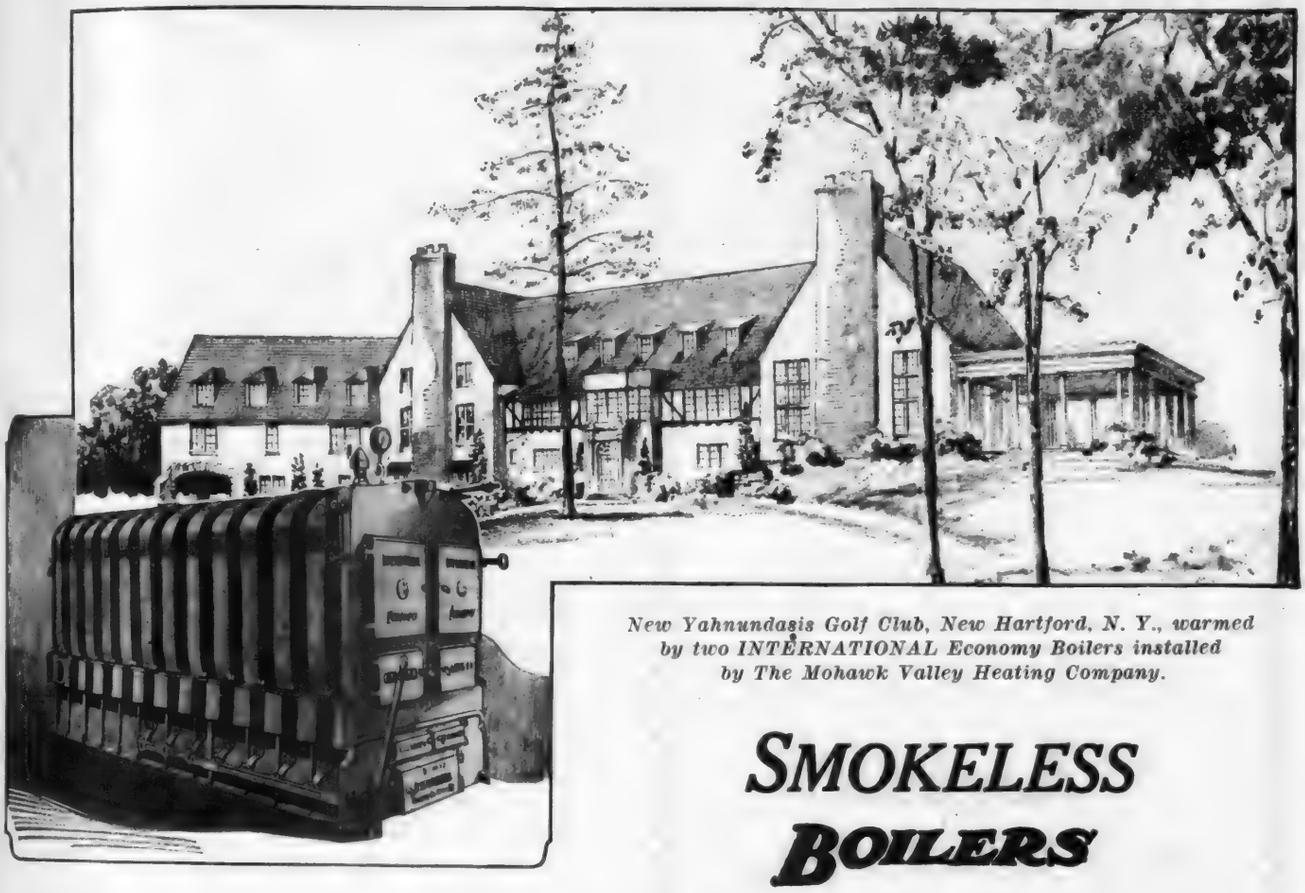
DAHLQUIST MFG. CO.

40 WEST 3rd STREET, BOSTON, MASS.



Dahlquist Aquatherm Copper Range boiler installed in connection with gas tank water heater, water back in coal or wood kitchen range in kitchen, and indirect water heater in cellar.

INTERNATIONAL ECONOMY



New Yahnundasis Golf Club, New Hartford, N. Y., warmed by two INTERNATIONAL Economy Boilers installed by The Mohawk Valley Heating Company.

SMOKELESS BOILERS

Economy Boilers are being specified by leading architects and heating engineers primarily on construction and performance—not solely on the reputation of the manufacturers.

They deliver dry steam without a pipe header. Steam separation is absolutely taken care of within the boiler. This means a marked saving in the cost of pipe and fittings.

There is no chance for the grate connections to clog or warp. They are placed outside of ashpit and can be set to operate from either the right or left hand side of the boiler.

The Economy Smokeless is easy to fire. Only one grate is used; there are no special arches, and the auxiliary air is admitted under convenient control.

Any fuel ordinarily used for heating purposes may be successfully used in the Economy without special methods of firing.

INTERNATIONAL HEATER COMPANY

UTICA, N. Y.

Branches and Warehouses at:

NEW YORK CHICAGO CLEVELAND DETROIT NASHUA, N. H.

70⅞ inches wide; 80¼ inches high; 50 inch grate.

Easy
—to Stoke
—to Install
Easy on the Coal Pile

There are several reasons for this unusual combination of advantages.

First it is the

Burnham
Twin Sectional Boiler

WHICH means that it has the extra long fire travel that makes extra short coal bills.

The Burnham sectional construction permits entry through narrow doorways and passages. Putting this large, heavy-duty boiler into a completed building is, therefore, easy.

An ordinary fireman can handle it; thus you save the usual extra cost of a licensed man. Its 50-inch grate is in four sections, each of which can be shaken separately.

Being a low pressure steam boiler, of cast iron construction, it costs less than tubulars. Does more, too—and lasts much longer. We have the proof. Shall we show you? Simply ask for Twin Section Catalog.

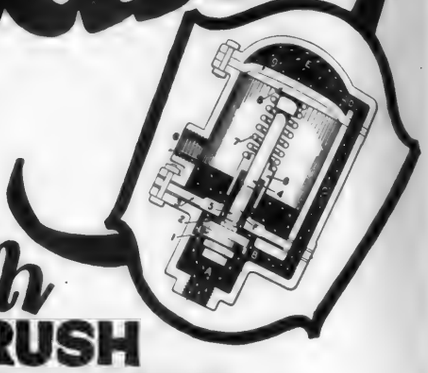
Burnham Boiler Corporation

IRVINGTON, N. Y.

Representatives in all Principal Cities

Canadian Offices:
Harbor Comm. Bldg., Toronto
124 Stanley St., Montreal

Absolute Safety



with THRUSH PRESSURE RELIEF VALVE!

THRUSH System of Hot Water Heating increases the heating efficiency of any hot water job, permitting higher temperatures with absolute safety.

No Broken Boilers

Thousands of Thrush Systems in use for years without a kick-back or complaint prove it. The Thrush Pressure Relief Valve is scientifically designed and is the most positive and "sure-to-act" pressure relief valve ever designed.

A Differential of Ten to One!

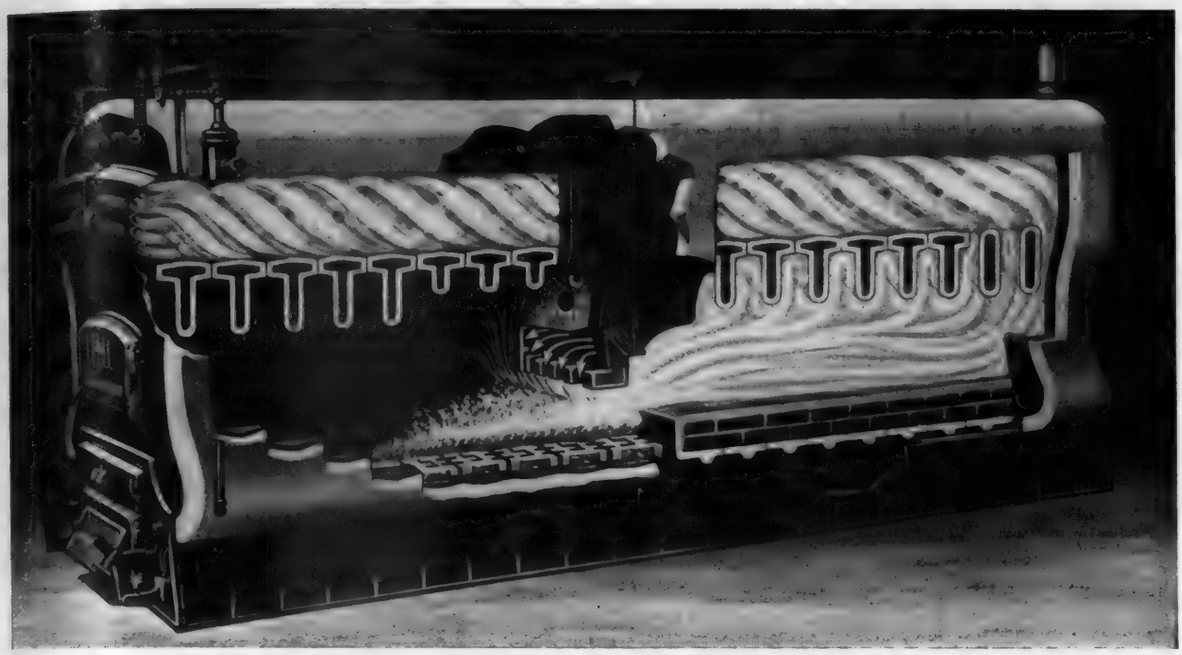
The Thrush Pressure Relief complies with the 1925 A.S.M.E. code and is endorsed by leading heating engineers. The safety factor of ten to one removes the slightest chance of danger. Be safe with Thrush!

WRITE FOR CATALOG!

Thrush System of HOT WATER HEATING

H. A. Thrush & Co.

PERU, INDIANA.

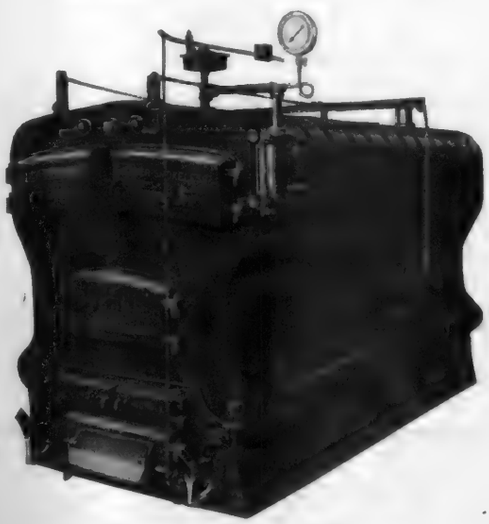


Cutaway View of Utica-Imperial SUPER-SMOKELESS Boiler

UTICA-IMPERIAL
SUPER-SMOKELESS BOILERS

Complete Combustion with Cheap Soft Coal

A recent improvement put the Air Regulation under easy control from the front of the boilers.



Exterior View of Boiler

Utica-Imperial SUPER-SMOKELESS Boilers burn even the cheaper grades of soft coal not only smokelessly but with great economy and efficiency. This means not only low first costs of fuel but a distinct saving in the amount consumed. This is accomplished by admitting heated air to the fire, on the principle of the Bunsen Burner, and burning smoke and soot as fuel of remarkable heating value. Utica-Imperial SUPER-SMOKELESS Boilers have proved themselves to be remarkably efficient for oil-burning, and will, when required, utilize other types of fuel, thus protecting the owner against any fuel emergency. Engineers and Contractors are invited to write for complete information.

Manufactured by the

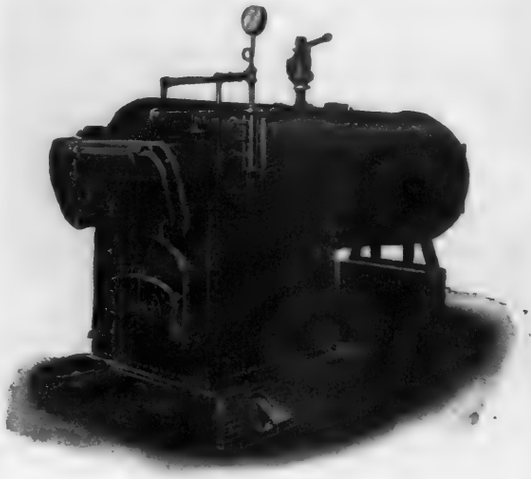
UTICA HEATER COMPANY

UTICA, NEW YORK

CHICAGO CLEVELAND NEW YORK

Sales Offices in the Principal Jobbing Centers

AMES
Firebox Heating Boilers



Ames Firebox Heating Boiler with Plain Furnace

Built with Plain and Downdraft Furnaces. Incorporating the Latest and Most Advanced Ideas in Boiler Design and Construction.

We also build a complete line of Horizontal Tubular, Upright and Empire Boilers for Heating and Power Requirements.

Bulletins with complete details mailed on request.

Empire Return Tubular Portable Boiler

AMES IRON WORKS

DIVISION OF

Pierce, Butler & Pierce Mfg. Corp.

Main Office & Works
Oswego, N. Y.

General Sales Office
41 E. 42nd St., New York City

McDonnell & Miller Duplex Water Feeder installed in the retail shoe store of W. L. White, Des Moines, Iowa.

With Any Kind of Fuel

THE McDonnell & Miller Duplex Water Feeder is *not* a control that is applicable to oil fired heating boilers only, for its function is to control the water line in any low pressure boiler, regardless of what fuel is used.

It is *not* a return trap, but a control that supplies makeup water to compensate for losses in the system, and disposes of excess condensate that may be held up due to long runs or peculiarities in the piping.

It is the best protection against cracked sections and burned boilers because it maintains a water line that is always *just right.*

Send for Bulletin H-5

McDonnell & Miller

"Doing One Thing Well"

General Offices
Wrigley Bldg.
CHICAGO

M&M WATER FEEDER

Eastern Warehouse Stock
Bush Terminal
NEW YORK

PAGE BOILERS

"The Distinguished Service Line"

Monarch Smokeless Boiler
(Cutaway View)

It is pretty well understood that if a heating plant is properly engineered and later turned over to the care of a competent fireman, even a boiler of poor design will probably give fairly good results.

But do you not owe it to your client to give him the best in boiler design, to fit the conditions of his building?

Page Boilers are making many thousands of good heating plants produce results, often exceeding expectations, with the minimum of attention and lowest fuel cost.

For All Fuels—
Hard Coal,
Soft Coal,
Gas or Oil.

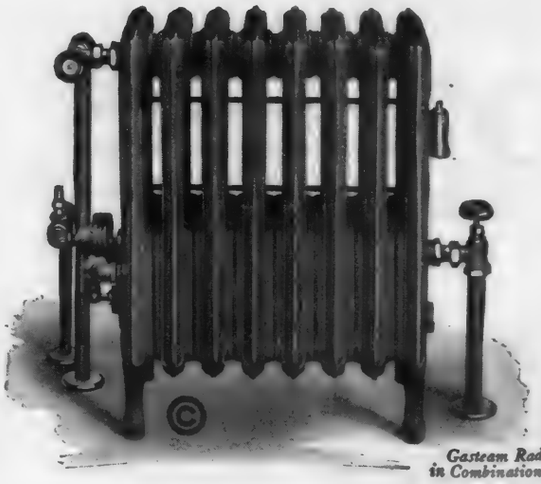
Send for Catalogue 51. It gives you in concise form, complete specification data.

THE WM. H. PAGE BOILER CO.

58 West 40th Street
NEW YORK

BOSTON **CLEVELAND**
PHILADELPHIA **MEADVILLE**

Established 1856 **Incorporated 1877**



Gasteam Radiator in Combination System

Two Heating Systems in the Same Number of Radiators

TWO for one is good trading. It is also good heating if, in the standard heating system, there is also a heating system that is ideal for the cool days of fall and spring.

That is what Combination Heating Systems offer.

The Clow Gasteam Radiators are a part of the standard steam heating plant. They act as ordinary radiators while the heating plant is running. But also they are available for heating the rooms in which they are placed when the heating plant is shut down.

The boiler can be started a month or two later in the fall and shut down a month or two earlier in the spring.

Installing Clow Gasteam Radiators in the living room and dining room of apartments or in offices in combination with standard heating plants is the simplest sort of pipe fitting job.

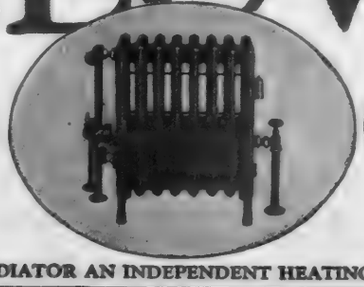
The occupant of the apartment has steam heat when and where he wants it. If he wants heat when the boiler is shut down—at night in winter or in spring and fall—all he needs to do is to turn the valves, strike a match and light the Clow Gasteam Radiators.

Clow Gasteam Radiators can be furnished for either vacuum or vapor, one or two pipe systems. Also Clow Gaswater Radiators for hot water systems.

JAMES B. CLOW & SONS
534-546 S. Franklin St., Chicago
Sales Offices in Principal Cities

CLOW

GASTEAM



GASWATER

EACH RADIATOR AN INDEPENDENT HEATING PLANT

NEW YORK STOCK EXCHANGE

—

TROWBRIDGE & LIVINGSTON
Architects

—

ALVORD & SWIFT
Heating & Ventilating Contrs.

Copyright Irving Underhill

Uniform Reliability

ONE firm of Engineers specified over 12 miles of Whitlock Coils for air conditioning service in the New York Stock Exchange Building.

Another firm specified Whitlock Storage Heaters to supply 35,000 gallons of hot water an hour for the new Benjamin Franklin Hotel in Philadelphia.

Different types of apparatus and different types of service—but engineers have confidence in the uniform reliability of this whole family of products.

When it is a question of Storage Heaters, Instantaneous Heaters, Swimming Pool Heaters, Converters, Condensation Coolers, Fuel Oil Heaters or Coils for any purpose—you have a question which Whitlock Engineers can answer for you. Telephone or write the nearest office.

THE WHITLOCK COIL PIPE CO.
40 South Street, Hartford, Conn.
New York Chicago Boston Philadelphia
Baltimore Buffalo San Francisco

WHITLOCK
HEAT TRANSFER
PRODUCTS

ROYAL

ROUND SECTIONAL and SMOKELESS BOILERS

HART AND CROUSE

A few of the many prominent buildings heated by ROYAL Boilers:

Building	*City*	*Architect*	*Contractor*
*Barrett Building	New York	Warren & Wetmore	Baker, Smith & Co.
*Strauss Building	New York	Warren & Wetmore	Baker, Smith & Co.
*Nat'l Ass'n Bld'g.	New York	Starret & Van Vleck	Gillis & Geoghegan
*Little Building,	Boston	Blackall, Clapp & Whittemore	Isaac Coffin Co.
*Home Bank & Trust Co.	Toledo	Walker & Weeks	Thos. Kewley & Sons
Munroe Apt. Hotel	Richmond	Alfred Bossom	W. G. Cornell Co.
*Baptist S. S. Board Bldg.	Nashville	R. E. Hart	Standard Eng. Co.
*Hotel Hamilton	Washington	T. H. deSibor	The G. & H. Ht'g Co.
Evergreen Bell Tel.	Philadelphia	John T. Windrim	W. M. Anderson
*Rollman Dept. Store	Cincinnati	Albert Kahn	Peck, Hannaford & Peck
Palmetto Hotel	Detroit	J. Will Wilson	W. J. Rewoldt & Co.
Bethany Girls Club	Chicago	Otis & Fuller	A. Kilander & Co.
Keeline Building	Omaha	John Latenser & Son	Dan Whitney
Hotel Senator	Sacramento	McDonald, Couchet & Rosenwald	Latourette-Fical Co.

*Illustrated above

Cosy Cottage
or
Soaring Skyscraper

HART & CROUSE COMPANY

UTICA, N. Y.

BRANCH OFFICES

Boston	*Detroit	*Philadelphia
*Chicago	Grand Rapids	Pittsburgh
Cincinnati	Milwaukee	*St. Louis
Cleveland	*New York	*Utica

*Warehouse in connection

BRYANT HEATING

for Hot Water — AUTOMATIC GAS — Steam *or* Vapor

Every Month the Roster Grows!

A few of the well-known architects who specify gas heating. (Others will appear in later issues of this publication.)

Bonard & Parson
Cleveland, O.

Parker, Thomas & Rice
Baltimore, Md.

Nolte & Nauman
St. Louis, Mo.

Samuel Hannaford & Sons
Cincinnati, O.

Herman & Brown
Dayton, O.

Miller & Reeves
Columbus, O.

August C. Wilmanns
Chicago, Ill.

Gas heating is striding to the fore! Promotion work by gas companies, by the 20 Bryant sales offices and by Bryant national advertising is making the incomparable convenience, the positive comfort and absolute cleanliness of gas heating better realized throughout the whole nation.

Every month the roster of well-known heating engineers who consistently recommend "automatic gas heating" is greatly lengthened.

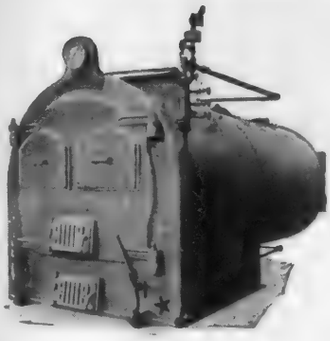
THE BRYANT HEATER & MFG. COMPANY
954 East 72nd Street, Cleveland, O.

Branches in all Principal Cities

STANWOOD

SMOKELESS BOILERS

for Heating or Power



High Economy is obtained by

Pre-heated Air
Complete Combustion
Better Circulation
Air-tight Steel Furnace
Low Chimney Gas Temperatures

Stanwood Advantages

Low Water Line
Require Little Headroom
No Mudlegs. No Staybolts
Shell Cannot Burn or Bag
Quickly Installed
Easily Accessible
Low Cost of Maintenance

Stanwood Boilers for Better Heating Plants

Built to A.S.M.E. Code
Built for Heating at 15 lb. working pressure
Heating Capacity 3500 to 26,000 sq. ft.
Sizes from 29 to 210 H.P.
Built for Power at 125 to 200 lb. working pressure.

Reduce Steam Cost

THE superiority of Stanwood Boilers is accomplished by a combination of advantages based on long study and a thorough knowledge of boiler requirements.

The reduction of steam cost is the basis of economical heating. This is obtained in the Stanwood Boiler, which burns low grade coal economically.

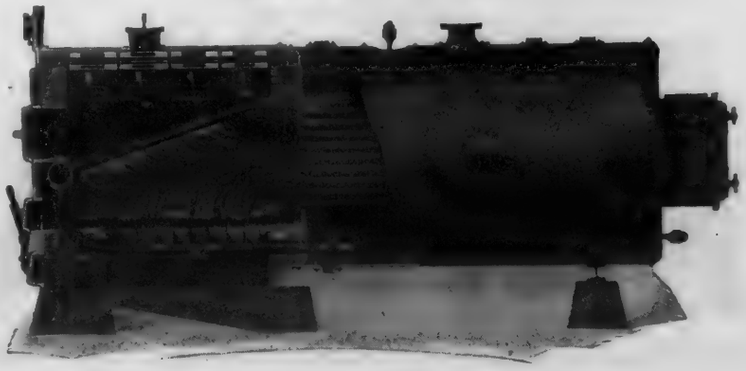
Stanwood Boilers operate efficiently with Coal, Oil or Gas.

Many inportant installations in both Heating and Power service.

WRITE FOR CATALOG

The Stanwood Corporation

CINCINNATI, OHIO



NATIONAL

The University of Tennessee

One of the many modern school and college buildings in which "NATIONAL" Pipe was used.

Wrought Pipe with a "College Education"

The chief purpose of school and college is to qualify the student for the duties of life. A similar purpose of this Company is to qualify pipe for successful service by building into it certain advantages which long experience, a complete organization, and exclusive manufacturing processes make possible. "NATIONAL" Pipe has been nearly 60 years getting its "college education." During this long course of study and development it has been at the "head of the wrought pipe class," or, in campus language, the "class" of wrought pipe.

Numerous awards and medals bestowed for merit have not slackened the quest for greater knowledge. Improvement is held as important today as it was nearly 60 years ago. As a result, this pipe is being fortified with accumulating qualifications for giving long and satisfactory service.

A maintained "high grade" in *uniformity, durability* and *dependability* permits "NATIONAL" Pipe to "pass all tests" as the *Recognized Standard of Wrought Pipe.*

Ask for Bulletin No. 25—"NATIONAL" Pipe in Large Buildings.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

DISTRICT SALES OFFICES IN THE LARGER CITIES

"NATIONAL" PIPE

Handon Sales in July Show 60% Increase

over the best previous HANDON month. Why not "Handle the HANDON" and increase your boiler volume? Here are a few jobbers who find it profitable:

Baltimore, Md.
Baltimore Plumbing Supply Co.
Monumental Supply Co.

Bayonne, N. J.
Broadway Plumbing Supply Co.

Binghamton, N. Y.
Prescott Supply Co.

Boston, Mass.
Roberts, Holmes Co.
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Brooklyn, N. Y.
W. A. Case & Son Mfg. Co.
Saltser & Weinsier, Inc.
Simon Gasner & Sons Co.
M. Lehman & Sons
B. F. Gilmour Co., Inc.

Chester, Pa.
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Cleveland, Ohio
The W. M. Pattison Supply Co.

Columbus, Ohio
Plumbers & Factory Supply Co.

Detroit, Mich.
W. A. Case & Son Mfg. Co.

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Flushing, N. Y.
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Nashville, Tenn.
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Newark, N. J.
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Thomas Somerville Co., Inc.

Why not join the growing list? Handle a profitable boiler.

Send for catalogue and discount sheet to

HANDON BOILER CORPORATION
101 PARK AVENUE - - - NEW YORK CITY

HANDON

CHARCOAL IRON BOILERS & TANK HEATERS

Some of the Features of the EverHot AUTOMATIC WATER HEATER

1—Heating Surface.
2—Burner.
3—Thermostat.
4—Absence of Condensation.
5—Freedom from Liming.
6—Freedom from trouble.

3—The Thermostat

The thermostat used in the EverHot Water Heater has been successfully used for over twenty-four years. We unhesitatingly state that it is the most simple and trouble-free thermostat ever made.

This thermostat is a triumph of modern machining. It is all metal—no leather seats to wear—no stem packing to leak or stick. It is made entirely of copper and brass with the exception of the fixed member which is a carbon rod. It will last indefinitely and is always accurate.

It is of the graduated type as distinguished from the old style snap action mechanism. With the snap action valve the burner is either on full or entirely off. With the graduated valve such as we use, gas is passed exactly in the quantity needed. This results in a constancy of temperature not possible with the snap action mechanism.

Subjects 1 and 2 were treated in the two preceding issues of Heating & Ventilating. Subject 4—"Absence of Condensation," will be treated in next issue.

Prices
Baby Grand $66 — Junior $99 — Senior $160

EverHot Heater Company

5215 WESSON AVENUE **DETROIT, MICHIGAN**

ROSS STEEL HEATING BOILERS
FUEL SAVERS

Novel design giving most effective heating surface arrangement with perfect circulation of water and long travel of fire.

LONG LIFE

In Ross Boilers is assured with lowest cost of maintenance because of the exclusive mechanical features and highest quality of workmanship and material.

Superiority Proved in Every Installation.

Approved by Leading Engineers.

Burns Coal Smokelessly.

Parts Simple and Standard.

The Perfect Oil Burning Boiler.

Electrically Welded to Comply with A.S.M.E. Code.

PATENTED

MADE BY

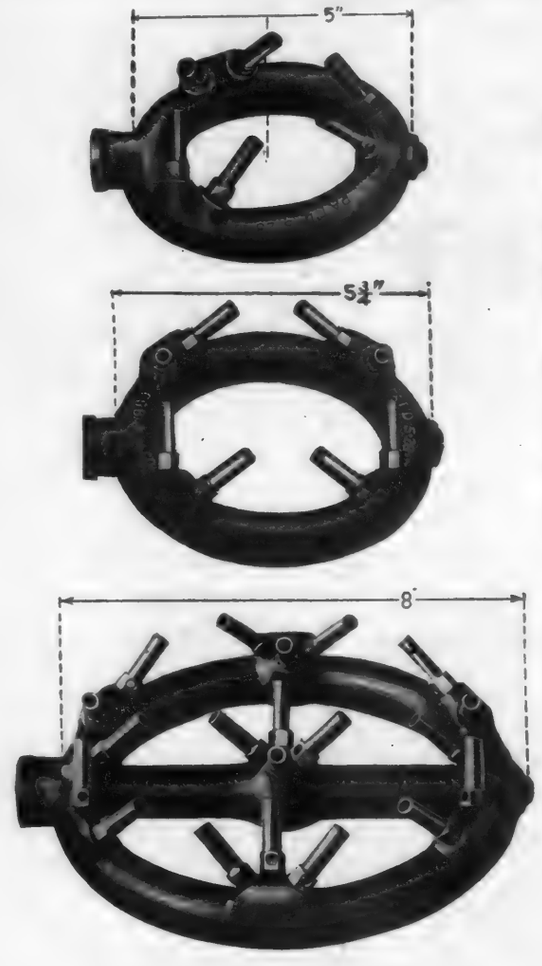
The Frost Manufacturing Co.

ESTABLISHED 1851

MAIN OFFICE AND WORKS GALESBURG, ILL.

Chicago Sales Office 112 West Adams St., Chicago, Ill.

The Most Prominent Appliance Manufacturers are turning to—



BARBER Patented JET GAS BURNERS

They realize, that without the proper burner, no appliance can stand the test, and that the most perfect burner made is the Barber Patented Jet Burner.

Put the best materials into your appliance—the most scientific design—skilled workmanship and the greatest care in manufacture—yet it is all lost if the burner does not operate efficiently, for your appliance is no better than its burner.

Why not use Barber Burners in your appliances? They not only increase efficiency, but they increase sales.

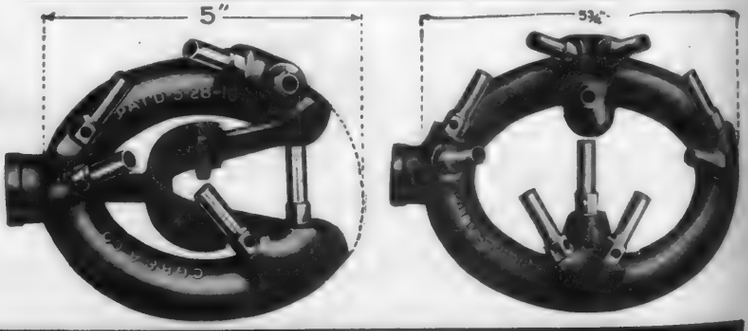
Here are the features that make Barber Burners the leaders in the field:

1. *Will reduce gas bills 25 to 40 per cent.*
2. *Render the pilot light unnecessary.*
3. *Can be controlled with any good thermostat.*
4. *Will not back-fire, or deposit carbon, upon any gas pressure.*
5. *Will develop a flame temperature of 1960 degrees Fahr. with 500 B.T.U. gas.*
6. *Require no adjustment, regardless of pressures or quality of gas.*
7. *Jets or orifices cannot become corroded or clogged or affected by condensation.*
8. *Will produce a perfect orange-green flame with Manufactured, Natural or Mixed gas.*
9. *Are the result of over seven years' careful development by Gas Burner Specialists.*
10. *Have been adopted as Standard by leading Heater and Gas Appliance Manufacturers.*

Send for the Barber Burner literature, prices and discounts today.

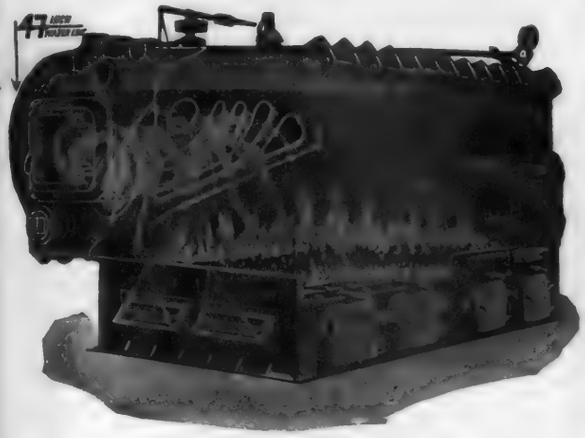
The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3102-04 Superior Avenue. Cleveland, Ohio

Distributers—We have some excellent territory available for distributors familiar with gas burning appliances, who are able to open show rooms and who are able to finance their sales.



Continental

BOILERS AND RADIATORS



Why The Continental is More Than Just a Low Water Line Boiler

IN ADDITION to having low 43″ and 47″ water lines, the Continental Low Water Line Boiler is designed to assure highest boiler efficiency under all working conditions.

Side feed makes it unusually easy to fire.

Short grate bars shaking in twos and threes provide perfect fire control.

Long forward and back fire travel assures maximum heat absorption before reaching chimney.

Water tubes in direct contact with flames make it a quick steamer—you don't have to force it.

Ample water capacity prevents priming even on fan systems.

Continental Low Water Line Boilers are made in regular and smokeless types and are well adapted for oil burning.

A complete range of sizes is built for residences, apartments, churches, schools and industrial buildings.

30 Series Boilers—43″ Water Line
1,200 to 8,200 sq. ft. steam capacity

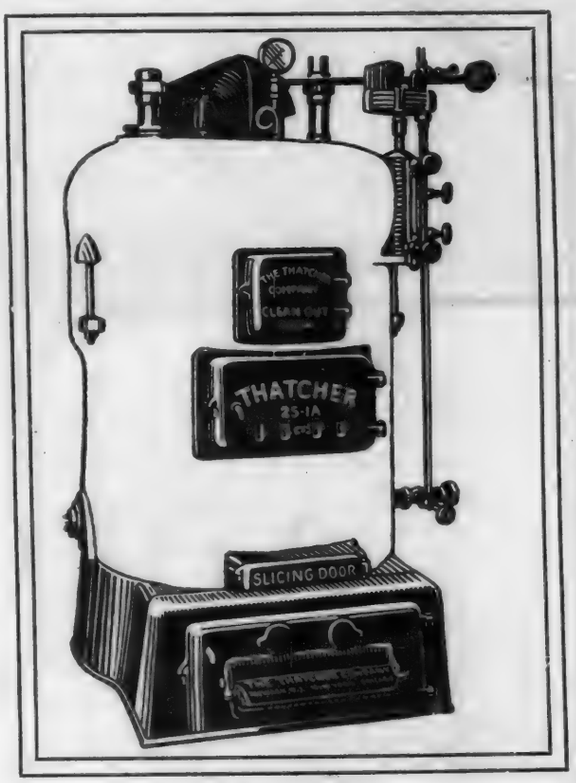
40 Series Boilers—47″ Water Line
2,500 to 22,300 sq. ft. steam capacity

Continental Heater Corporation
Dunkirk, N. Y. U.S.A.

This Continental Book gives the complete story of all Continental Boilers and Radiators. Your name on a post card will bring your copy by return mail.

Built for better heating

How We Help You to Increase Sales



No. 2

IN addition to the thousands of good prospects we are creating for Thatcher Dealers through our intensive newspaper Advertising Campaign, we are reaching other equally important fields. We are advertising effectively to architects, builders and owners of country homes, through the medium of their individual publications.

Pick up almost any architectural, building or suburban magazine, and you will find Thatcher Boilers and Furnaces prominently advertised.

The many inquiries which result, are turned over to Thatcher Dealers in the localities from which they originate.

This means that our Dealers are constantly supplied with the right kind of prospects who are quickly converted into buyers of Thatcher Products. Write for full information on our Advertising and Sales Plan.

THE THATCHER COMPANY

Formerly Thatcher Furnace Co.
Since 1850

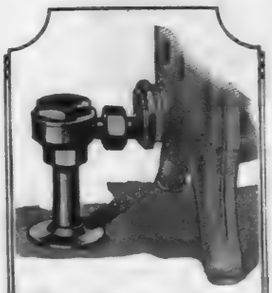
21 W. 44th St. NEW YORK | 39-41 St. Francis St. NEWARK, N. J. | 341 N. Clark St., CHICAGO

THATCHER

BOILERS-FURNACES-RANGES

This Roman bridge was built across the Tiber by Hadrian in 134 A. D. After nearly 1800 years of continuous use it is still delivering adequate service to the citizens of Rome and to the modern motorist. It is a fitting example of the adequacy of correct design and construction wrought into materials of quality.

ADEQUACY



The Dunham Thermostatic Radiator Trap

The silent, efficient watchdog of the coal pile.

The Dunham Packless Radiator Valve

A fitting companion to the Dunham Trap is the Dunham Packless Radiator Valve.

If a heating system supplies only sufficient heat for mild weather, and fails to give an abundance of heat in severe weather; if it does not easily and completely meet the demands of changing outdoor temperatures, it is not adequate. Neither is it a Dunham Installation.

ADEQUATE heating in any type of building is what the owner most desires. He wants to be confident that there will be plenty of warmth on cold winter days. He wants it promptly when he needs it most because of a sudden drop in temperature. He wants to know that his heating system will not fail him under any conditions within an average lifetime.

Dunham Heating supplies this complete adequacy of warmth. It accomplishes this by adequacy of design, of construction and of material.

Dunham Design insures that a system gives complete satisfaction because each detail has been properly worked out.

Dunham Specialties, including the Thermostatic Radiator Trap and the Dunham Packless Radiator Valve, solve the important problems of adequately heated radiators and complete adequacy of heat control.

C. A. DUNHAM CO.

230 East Ohio Street - - CHICAGO

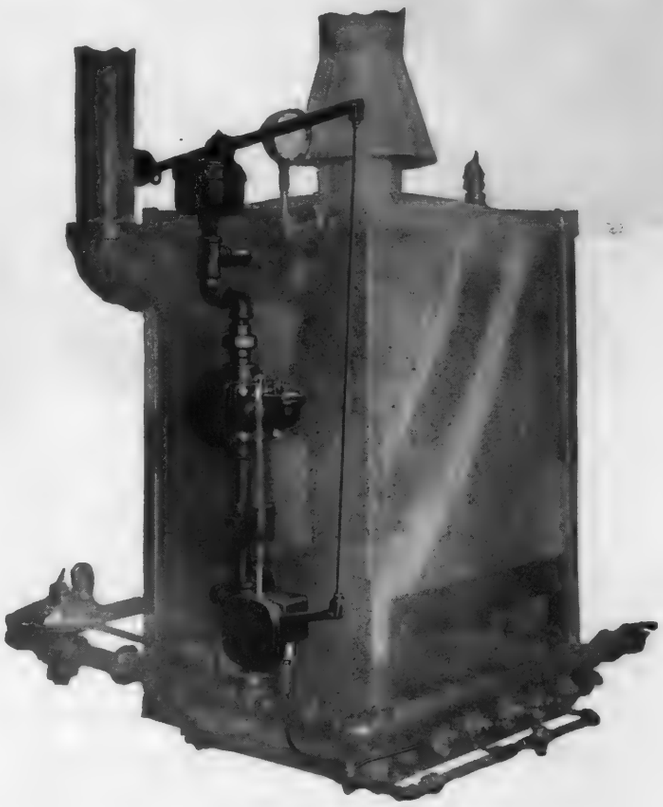
Over sixty branch and local sales offices in the United States and Canada bring Dunham Heating Service as close to your office as your telephone. Consult your telephone directory for the address of our office in your city.

The DUNHAM HEATING SERVICE

REG. TRADE MARK

It makes IDEAL Gas Boilers *fool-proof*

A New Master Control



The new Three-Function Snap-Valve with thermostatic pilot control; at the top is shown the automatic low-water Gas cut-out for steam boilers only.

THINK of an automatic snap-valve control that has these revolutionary advantages:

1—The gas can't be turned on until the pilot light is burning.

2—The gas is automatically cut off if the pilot light goes out.

3—The gas is automatically cut off if the water (in steam boilers) falls below the safe level.

Now, IDEAL Gas Boilers, in addition to their scientific construction and highest efficiency, can be ***absolutely fool-proof*** against the owner's lack of attention. The new master control valve can now be attached to either the Type 1-G or Type 3-G Gas Boiler. Like these boilers themselves, this new control is a product of the American Radiator Company.

For further details, ask your gas company, or send to the address below.

THE A. H. WOLFF GAS RADIATOR CO.

Distributors of American Radiator Company's IDEAL Gas Boilers

376 Lafayette Street Dept. G-49 New York, N.Y.

Ed, the Sarco Man, says

A dollar saved.
Is a dollar earned.
And your clients.
Will be grateful.
If you specify.
The Radiator Trap Sarco.
For it cuts fuel bills.
Also repair bills.
And puts Methuselah.
To shame.
By its long life.
Many Sarco features.
Of special interest.
Are explained.
In new Booklet P-125.
Sent on request.

Radiator Trap SARCO

Sarco Company, Inc.

231 Broadway
New York City

Boston Buffalo Chicago Cleveland Detroit Philadelphia
Peacock Bros., Ltd., Montreal

AGAIN—
Barnes & Jones

MISHKAN TEFILA TEMPLE
BOSTON, MASSACHUSETTS

KROKYN, BROWNE & ROSENSTEIN :: :: Architects
Heating and Ventilating Contractors, LYNCH & WOODWARD, Inc.

THE craftsmen and material were picked with unusual care, the quality and efficiency being the best obtainable, when Mishkan Tefila Temple was planned.

FIRST among the temples of its kind in Boston, a city famous for its beautiful temples, this million dollar edifice is a monument to technical and mechanical genius.

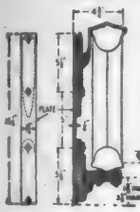
SEATING twenty-one hundred in the main auditorium, appointed and decorated finely, it is indeed a fitting temple for the proven quality and efficiency of Barnes & Jones heating apparatus.

Barnes & Jones

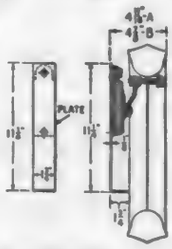
VAPOR *and* VACUUM HEATING SYSTEMS
5 Melrose Street BOSTON, MASSACHUSETTS

Send for this authoritative new book—

ARCO Adjustable Wall Brackets

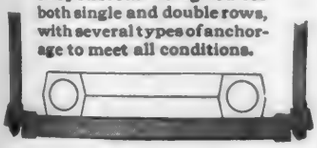


ARCO Bracket, No. 1 Single, for all "A" Peerless Sections; other sizes for "B" Sections and for double row sections are given in booklet.

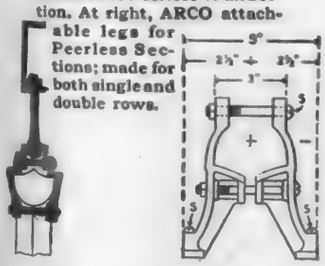


Another type of ARCO Bracket, for 5, 7 and 9 square foot sections in single row only.

ARCO Trapeze and Slip-End supports, used for ceiling suspension. Designed for both single and double rows, with several types of anchorage to meet all conditions.



At left, ARCO Pendant Flight attached to Peerless Wall Section. At right, ARCO attachable legs for Peerless Sections; made for both single and double rows.



EVERY ARCHITECT, Heating Engineer and Specification Writer will want this valuable new book for specification work. It contains the latest authoritative data on wall radiation, its many and varied uses and its specification for each particular requirement.

For years Peerless Wall Radiators have been the accepted standard for plant, factory and office heating; also for industrial work, humidifying, drying, cooling, and for countless uses where conservation of floor space is of first importance.

This new book pictures and describes these many uses. Of particular interest are the new forms of radiator brackets which allow Peerless Wall Radiators to be installed in a number of new ways, such as on the ceiling.

If you haven't this new book already in file, your name on your letterhead, sent to the address below, will bring it at once.

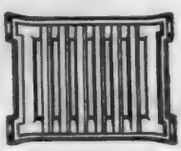
AMERICAN RADIATOR COMPANY

Dept. T-183 1807 Elmwood Avenue, Buffalo, N.Y.

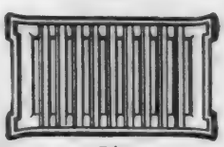
Sales Offices in all principal cities

SUPPORTING I=B=R MEMBER

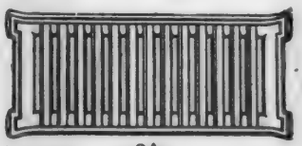
Peerless Wall Radiators are made in five sizes



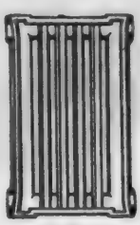
5A



7A



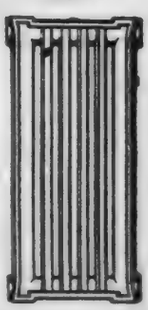
9A



9B

9 Foot Sections can be furnished with White Vitreous Enamel Finish.

7B



IDEAL BOILERS AND AMERICAN RADIATORS FOR EVERY HEATING NEED

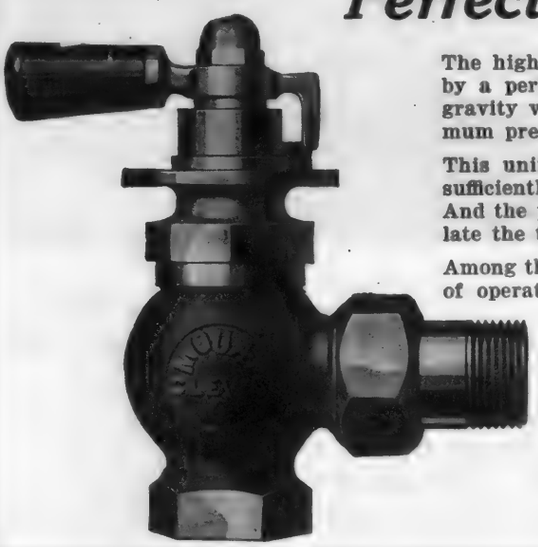
A Residence in Cleveland Heights, Ohio

VAPOR MOUAT HEAT

IN THESE BUILDINGS

Good Samaritan Hospital, Vincennes, Indiana

Perfect Regulation and Control

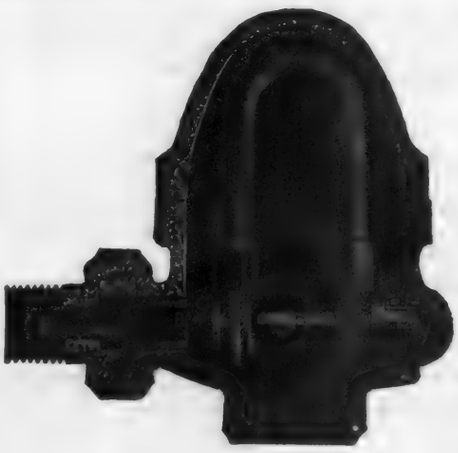


The high efficiency of the Mouat Vapor Heating System is accomplished by a perfect combination of Regulation and Control. It is a two-pipe gravity vapor or atmospheric steam heating system operating at a minimum pressure of one-half ounce or more as required.

This uniform pressure is maintained by the Mouat Damper Regulator, sufficiently sensitive to operate at a variation of less than one ounce. And the positive hand control at each radiator makes it possible to regulate the temperature in each room.

Among the several distinctive advantages of this system are its simplicity of operation and absence of mechanically operated and intricate parts. Rapid changes in temperatures or extremes in temperatures do not affect the efficiency of Mouat System. It is flexible and meets all demands, and is adaptable to all types of buildings. Let us send full details.

MOUAT VAPOR HEATING COMPANY
CLEVELAND, OHIO



The Perfect Automatic Valve for Vacuum or Vapor Heating

"VENTO" Advantages

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

The "Vento" Automatic Valve represents a steady improvement in the Haines line of steam traps and offers the highest degree of steam trap efficiency.

There has been no change in the old reliable principle that has placed Haines Automatic Valve in a class by itself. The operating power is identical—the only difference being in the general construction.

Special features are: Horizontal mounting of valve mechanism—long range of movement—positive action—quick opening and closing.

Send for booklet

WILLIAM S. HAINES & CO.
12th & Buttonwood Streets
PHILADELPHIA, - - PA.

VENTO

16" line in Pearl St., Grand Rapids, Mich., showing Adsco Underground Casing Construction.

ADSCO

Red Diamond Brand Casing

Is a permanent and durable conduit and efficient insulation.

The staves of lumber used in ADSCO Diamond Brand Casing are kiln dried. The joints will remain tight after steam is turned into the line and the high efficiency will be retained. The life of the conduit is also prolonged.

By the thorough kiln drying process the lumber is reduced about 25% in weight which cuts transportation and handling expense, and speeds up the installation.

Over a million feet of underground steam and hot water lines have been insulated with ADSCO Red Diamond Brand Casing since 1877. A few of the many cities in which thousands of feet of ADSCO Red Diamond Brand Casing is serving efficiently are York, Wilkes-Barre, Pittsburgh, Erie, Dayton, Grand Rapids, Saginaw, Little Rock, Denver, Indianapolis, Seattle, San Francisco.

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

Offices:
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ADSCO HEATING

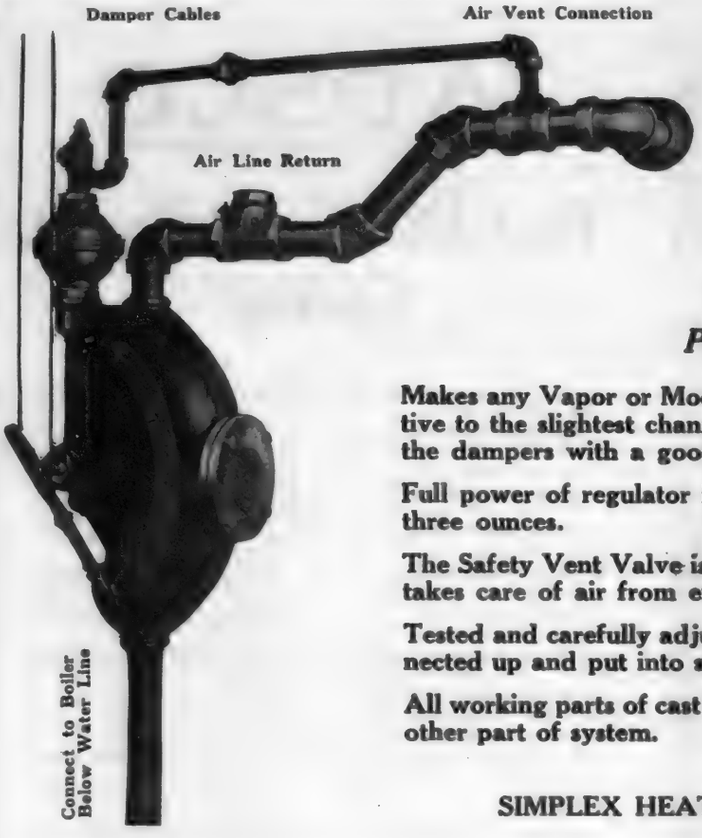
AMERICAN DISTRICT STEAM COMPANY North Tonawanda, N. Y. H-5

Send information on

- ☐ ADSCO Wood Casing.
- ☐ Expansion Devices.
- ☐ General data on Underground Steam Lines.

Name .....

Address .....



Vilter

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

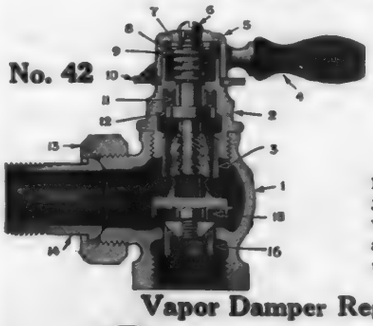
Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

McALEAR SPECIALTIES FOR VAPOR HEATING SYSTEM



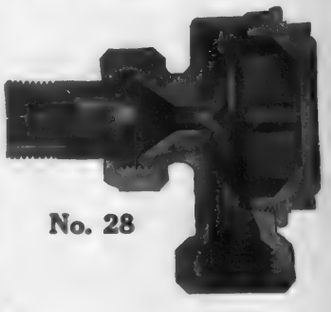
No. 42

Packless Radiator Valves

Quick-opening, nickel-plated brass body. Fig. 38, angle pattern, wood wheel handle; Fig. 42, angle pattern, graduating type, lever handle.

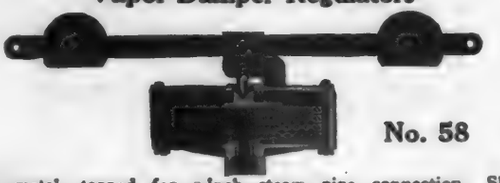
Radiator Traps

Discharge air and water in large quantities. Close tight against steam. Noiseless in operation. Nos. 28 and 28-A of steam metal, furnished N. P. unless otherwise specified. Nos. 28-A and 29-A have right and left-hand discharge openings. Nos. 29, 29-A, 33, 34 and 36 have iron bodies and brass caps, furnished plain unless otherwise specified.



No. 28

Vapor Damper Regulators



No. 58

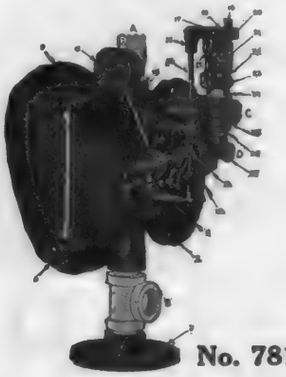
All metal, tapped for 1-inch steam pipe connection. Shipped complete with lever and two weights, S hooks, 2 ceiling pulleys and 12 feet of No. 10 plumbers' chain.

No. 56 for 0 to 3 pounds pressure, constructed with bellows of 10-inch flexible walls. No. 58 for 1 to 15 pounds pressure, constructed with bellows of 6-inch flexible walls.

Combination Float and Thermostatic Ball Check Valves

For venting supply and return mains of heating systems. These air valves close tight against water and steam, and by use of the check prevent the atmospheric pressure from entering the discharge opening.

No. 15



No. 781

Air Eliminator and Return Traps

For automatically returning the water of condensation direct to boiler and discharging air. Minimum distance between water line of boiler and bottom of trap should be 18 inches. "A"—inlet to trap; "B"—discharge to boiler; "C"—steam connection to boiler; "D"—air vent.

THE McALEAR MFG. CO.

1901-7 S. Western Ave.
CHICAGO, ILL.

What Can You Do About CORROSION In Hot-Water Pipes?

"Save the piping." That is the cry of the building owner or manager where unmistakable signs show that the hot-water piping is in the destructive grip of corrosion.

Good tidings! It can be done!

It is possible to save a piping system from further corrosion; fortunately the same remedy will work out of the system the rust and corrosion products which have accumulated.

Elliott Deaerators and Deactivators are accomplishing this result in many building hot-water systems. By removing the dissolved oxygen and other gases from the water, this apparatus definitely stops corrosion and clears up the piping system within a short time.

The first sign of corrosion is the time to act. Pipe metal which has been eaten away cannot be replaced, but deaerated water in the pipes will immediately eliminate any further corrosion and do an excellent job of pipe cleaning.

Heating and ventilating engineers should be familiar with the deaerating process which can save piping systems from corrosion. Ask us about it.

ELLIOTT COMPANY

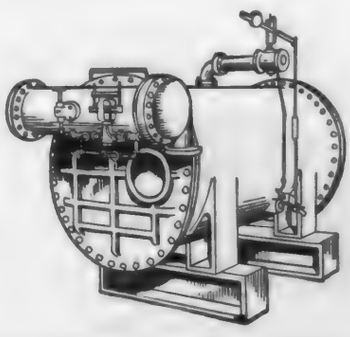
Pittsburgh, Pa.

General Sales Offices: Jeannette, Pa.

District Sales and Service Offices: Atlanta, Baltimore, Boston, Cincinnati, Cleveland, Chicago, Detroit, Kansas City, New York City, Philadelphia, Pittsburgh, and St. Louis

De-oxygen-ating Apparatus

Deactivators Deaerators



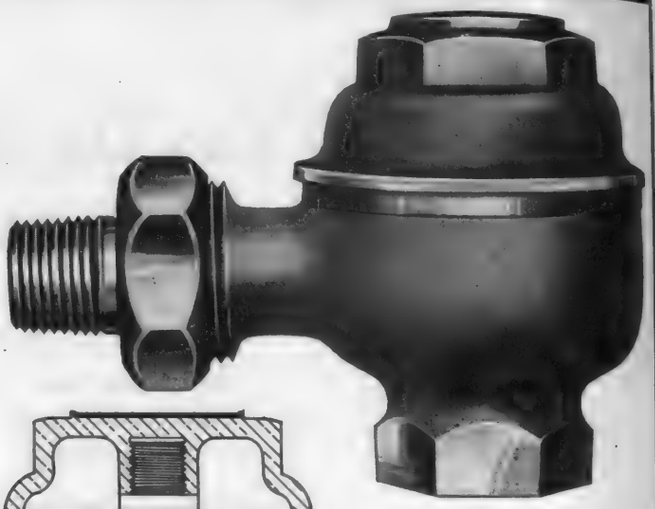
N-837

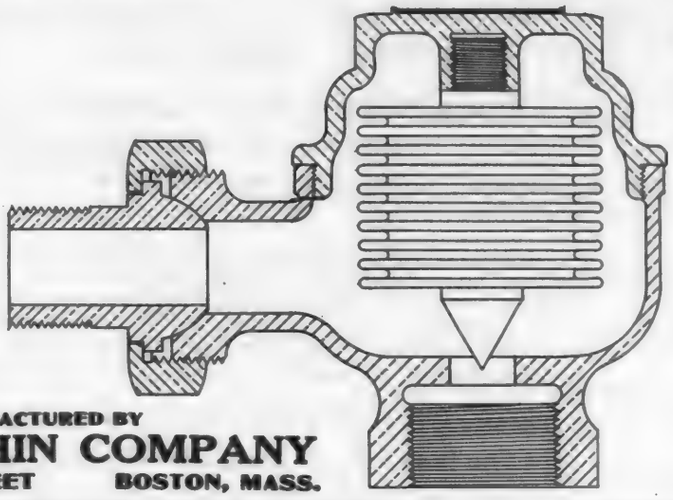
THE
W.D. CASHIN CO.
THERMOFLEX
No. 3
Thermostatic Trap
Embodies all the latest features of a bellows type trap.

High Efficiency.

Sturdy Construction.

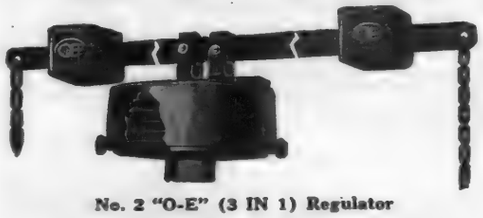
Attractive Price.





Why not write us and find out?

MANUFACTURED BY
W. D. CASHIN COMPANY
35 HARTFORD STREET BOSTON, MASS.



No. 2 "O-E" (3 IN 1) Regulator

Three Systems in One

Vapor, part of the time.
Vacuum, most of the time.
Pressure, when wanted.

TRADE O-E MARK

A Heating System That Can Be Relied Upon

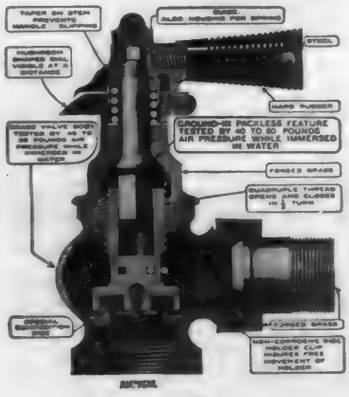
The elimination of floats, return traps, pumps, diaphragms and other complicated mechanism makes the O-E System of Heating the simplest and most efficient. One that provides Vacuum most of the time, Vapor part of the time, and Pressure when it is needed.

All parts carefully made and tested, and their performance has shown that they comprise a heating system that can be relied upon.

Many O-E users have heartily testified to the flexibility, economy and efficiency of the O-E Vapor Vacuum Pressure System.

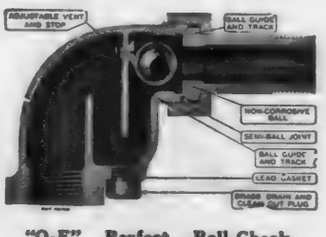
Let us tell you more about O-E and show you some interesting test data.

O-E SPECIALTY MFG. CO.
12 KEEFE AVENUE - - - - - - - MILWAUKEE, WIS.

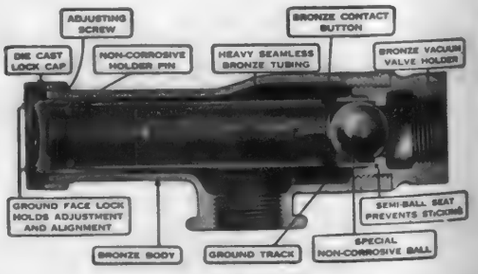

GUIDE ALSO HOUSING FOR SPRING
STEEL
HARD RUBBER
GROUND-IN PACKLESS FEATURE TESTED BY 40 TO 50 POUNDS AIR PRESSURE WHILE IMMERSED IN WATER
FORGED BRASS
QUADRUPLE THREAD SPRING AND CLOSES IN ¼ TURN
FORGED BRASS

"O-E" Improved Perfect Packless Graduated Valve.

Send for Catalog "A."



"O-E" Perfect Ball-Check Water Seal Union Elbow with Adjustable Air Vent.



"O-E" Improved Air Exhauster and Vacuum Valve

ARCO Packless Valves are made for steam, water, and vapor. Angle, corner and globe patterns. Round or lever handle.

Here is the New ARCO Packless

Quick opening Distinctive in appearance
Moderately-priced

ONE glance at the illustration above will tell you that the New ARCO Packless is more than merely good-looking; that it has a certain distinguished smartness which will instantly appeal to an owner.

Notice the pleasing contrast between the jet-black cap, the polished nickel, and the silvery-satin finish of the body.

Yet the price is so modest that you can use this valve on the ordinary jobs where you might feel that cost would not permit the luxury of a packless valve. Read our special offer below:

To help you sell ARCO Packless Valves to the owners of jobs you are now installing, we will send you a specially-finished 1-inch valve for $2.29. This sample valve will convince any customer that he should use packless valves, and the sample itself may be used on any job, if you so desire. Fill in and mail the coupon today.

American Radiator Co.
Buffalo, N. Y.

Please send me one 1-inch ARCO Packless Valve.

Firm name.....

Address.....

AMERICAN RADIATOR COMPANY

IDEAL Boilers, AMERICAN Radiators, ARCO Valves and Regulators

1807 Elmwood Avenue Dept. S Buffalo, N. Y.

Why does Oxweld have apparatus repair stations for you?

Apparatus Repair Stations

IF YOU are a user of Oxweld apparatus, your equipment undoubtedly will be working efficiently, because Oxweld fieldmen inspect it from time to time, make adjustments, and supervise minor repairs.

Furthermore, when major repairs are necessary, these can be made at once by the nearest apparatus repair station listed below. These repair stations make it unnecessary to ship your apparatus hundreds of miles across the country to one of our factories. Delays are reduced to a minimum.

OXWELD APPARATUS REPAIR STATIONS

Boston	Massachusetts
Newark	New Jersey
Philadelphia	Pennsylvania
Baltimore	Maryland
Buffalo	New York
Pittsburgh	Pennsylvania
Birmingham	Alabama
Cleveland	Ohio
Chicago	Illinois
Detroit	Michigan
Houston	Texas
Minneapolis	Minnesota
Omaha	Nebraska
St. Louis	Missouri
Tulsa	Oklahoma
Salt Lake City	Utah
Seattle	Washington
San Francisco	California
Portland	Oregon
Los Angeles	California

REGARDLESS of how well oxy-acetylene apparatus is made or how carefully it is used, repairs, replacements and adjustments will be needed if the equipment is to function efficiently day in and day out. In this your oxwelding apparatus is like your automobile.

The automobile makers early learned that repairs for the entire country could not be made at the factory. No owner could afford the delay. Oxweld learned the same lesson, and has already established apparatus repair stations in 20 industrial centers.

Every one of these 20 repair stations is factory supervised and gives Oxweld users quicker and more economical service than would be possible if the apparatus had to be shipped to a distant factory.

When you buy oxy-acetylene apparatus remember that from time to time it will have to be adjusted or repaired and inquire about facilities for this service.

OXWELD ACETYLENE COMPANY

Chicago	Long Island City, N.Y.	San Francisco
3642 Jasper Place	Thompson Ave. & Orton St.	1050 Mission Street

Oxweld

WELDING AND CUTTING APPARATUS

WORLD'S LARGEST MANUFACTURERS OF WELDING AND CUTTING EQUIPMENT

Between Crinoline and One-Piece is a Long Period of Progress!

The span of years between crinoline hoop skirt and one-piece bathing suit records an era of swift progress—progress in social codes and conventions as well as fashions, but most important of all, amazing progress in mechanical things. Machinery of every type and kind has been improved in productive efficiency.

So, too, with Air Washers—machinery for ridding the air of solids and suspended impurities. Time was when the only practical apparatus for this purpose was a cloth screen, saturated with water, through which the air was forced. The first improvement was the bank of spray nozzles through which water was forced at high pressure, producing a fine spray through which the air passed before entering the distributing system.

Continued experiment and research resulted in the Bayley Turbo Air Washer—the most efficient air washing apparatus available today! It is based on the Bayley Turbo-Atomizer, consisting of a single fire type nozzle, which delivers the water to a rotor where it is whirled centrifugally through atomizing pins, forming a dense, even curtain of water. Its efficiency is far away and above that of high pressure, fine orifice multiple nozzle banks, because it cannot become clogged and requires only nominal water pressure for successful operation. These are its outstanding advantages—there are so many others; we can explain them best by sending you our Bulletin No. 25. Write to any Branch Office below or our factory direct.

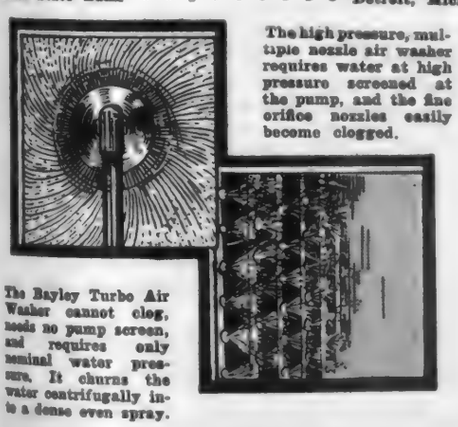
BAYLEY MFG. CO., 742 Greenbush Street, Milwaukee, Wis.

Representative Installations:

Washington School	Mason City, Iowa
Briggs & Stratton Co.	Milwaukee, Wis.
Fosh Intermediate School	Detroit, Mich.
Journal Building	Milwaukee, Wis.
Hartman Building	Chicago, Ill.
First State Bank	Detroit, Mich.

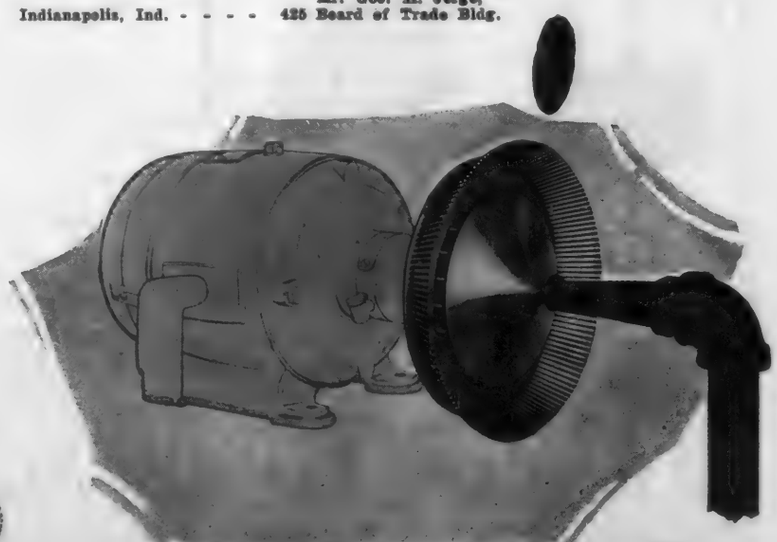
Sales Offices:

Chicago, Ill.	1156 First National Bank Bldg.
Cleveland, Ohio	523 Penton Bldg.
	Purcell Stone Co.,
Detroit, Mich.	2847 Grand River Ave.
St. Louis, Mo.	1928 Railway Exchange Bldg.
Des Moines, Iowa	403 Observatory Bldg.
	Leidendecker Bros.,
Pittsburgh, Pa.	Fulton Bldg., Second Floor
	P. W. Belcher,
Salt Lake City, Utah	Dooly Block.
	Mr. Geo. H. Jorge,
Indianapolis, Ind.	425 Board of Trade Bldg.



The high pressure, multiple nozzle air washer requires water at high pressure screened at the pump, and the fine orifice nozzles easily become clogged.

The Bayley Turbo Air Washer cannot clog, needs no pump screen, and requires only nominal water pressure. It churns the water centrifugally into a dense even spray.



Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS—PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

Will Not Clog

Vapor or Vacuum

So sensitive is this Regulator that it operates perfectly on a few ounces of pressure, vapor or vacuum.

METAPHRAM DAMPER REGULATOR

Has 10" Metaphram diaphragms that last the life of the boiler. Self collapsing diaphragms make it ideal for vapor systems.

May be used on vapor, or up to the 15 lbs. pressure.

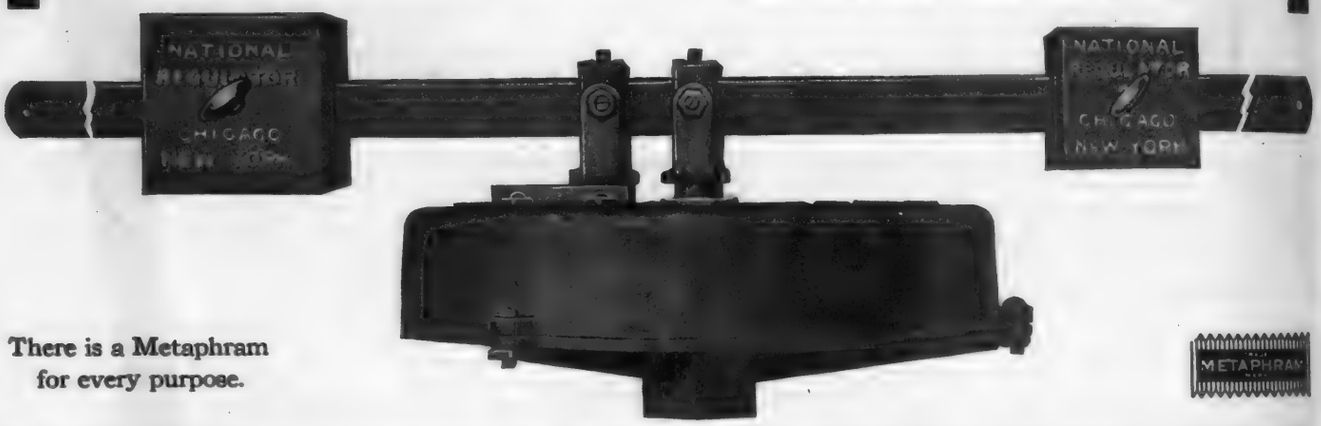
The Type D-10" Metaphram Regulator is furnished as standard equipment on all the better vapor systems.

This is only one of the complete line of Metaphram Damper Regulators.

Send for circular if your dealer doesn't supply,

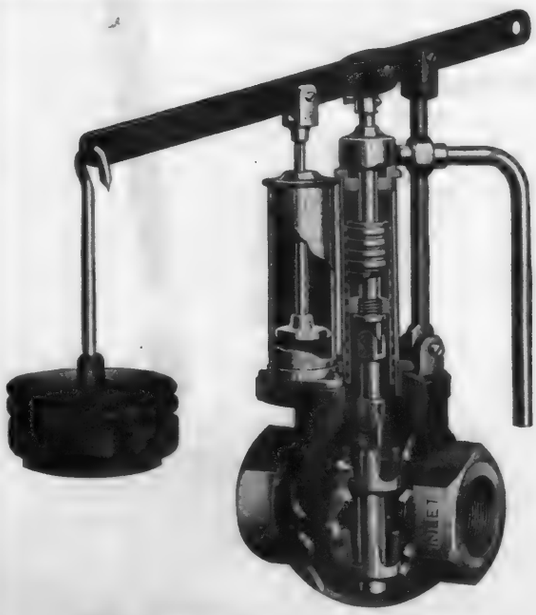
NATIONAL REGULATOR CO.
2501 KNOX AVENUE CHICAGO

The A-Jacks People (A-Jacks for high pressure)



There is a Metaphram for every purpose.

METAPHRAM



No. 1 Pressure Regulator—Piston Type
Made in sizes ¾ to 14 in. inclusive—Std. and Ex. Hvy.
Sizes 1½ in. and under made with bronze bodies—screwed ends only.
Sizes 2 to 6 in. inclusive made with iron bodies—screwed or flanged ends.
Sizes 7 in. and above made with iron bodies—flanged ends only.

KLIPFEL
PRESSURE REGULATORS

Automatically reduce any initial steam, air or water pressure to any desired reduced pressure above 2 lbs.

Maintain reduced pressure constantly regardless of fluctuations in boiler pressure, or changes in the demand for steam.

Simple, rugged and direct acting. As low pressure builds-up and exerts pressure under piston, a balance is formed between low pressure and weighting, which in turn regulates the inner valve opening.

Visible in action. Lever may be used to open, close or test by hand. Position of inner valve may be easily judged by looking at the lever.

Bronze cylinder, multiple grooved piston and balanced plunger type bronze inner valve. All working parts removable while valve body remains in the pipe line.

No troublesome springs, toggles, packing boxes or pilot valves. Dashpot included, which insures steady service pressure and overcomes any tendency of valve to chatter or vibrate.

Guaranteed to closely regulate at maximum steam loads, as the capacity—size for size—is equal to or greater than that of any competing pressure regulator.

We Invite Correspondence.

KLIPFEL MFG. CO., 2641-59 W. Harrison St. CHICAGO, ILL.

Manufacturers of a Complete Line of Steam Specialties including Expanded Outlet Pressure Regulators (Both Piston and Diaphragm Types)—Float Valves—Pump Governors—Back Pressure Valves—Relief Valves—Grease Traps—Steam Traps and many other Specialties.
Sold by Leading Jobbers in all Principal Cities—Write for Catalog No. 20.

CENTRAL MANUFACTURING DISTRICT, CHICAGO
S. Scott Joy, Architect. Kohlbry-Howlett Co.—Baker, Smith & Co., Heating Contractors

OVER 550,000 square feet of radiation in the largest vacuum heating system in the world supplied from one central power plant.

The illustration above shows but a portion of the buildings of the Central Manufacturing District, Chicago, extending over a frontage of practically a mile. The first unit was built 10 years ago and has been added to from time to time. ILLINOIS PRODUCTS were specified and used on the original unit and as each succeeding unit was added—a splendid tribute to the durability and lasting satisfaction of ILLINOIS HEATING SYSTEMS.

There are 25 years of specific experience and standardized design back of ILLINOIS HEATING SYSTEMS—they are tested and practical—all guesswork has been eliminated. To the architect this means satisfied clients, because he has specified a better heating system.

Our Engineering Department is instantly at your disposal to supply any information that you may require.

Consult telephone directory for address of local office.

ILLINOIS

PRODUCTS

Radiator Traps
Modulating Valves
Return Traps
Pressure Reducing Valves
Heat Retainors
High and Low Pressure Steam Traps
Blast Traps
Separators *—oil and steam*
Back Pressure Valves
Expansion Joints

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

CHICAGO

Another POINT *for your* Consideration !

This new knobby-grip handle fits the hand naturally

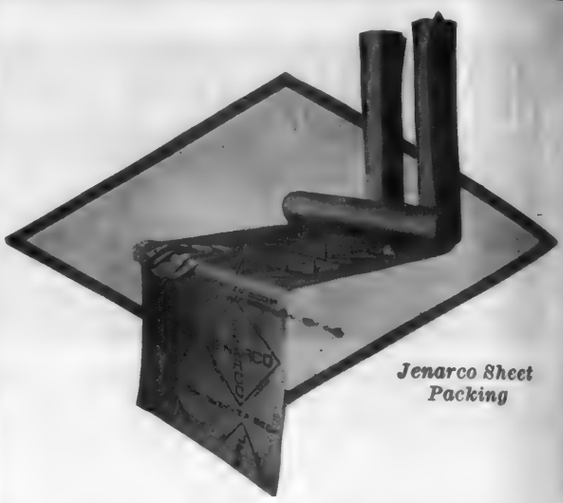
THE Commonwealth-Lavigne "knobby-grip" handle, with milled edge, is a logical development in handle design. It is naturally and easily grasped with the tips of the fingers and, since no metal is exposed, the handle always remains cool. This style handle will not collect dust and the milled edge always offers a clean, firm grip. In addition to the more practical features, its graceful design adds to the attractive appearance of Commonwealth-Lavigne Radiator Valves.

The new handle is another individual feature which, like the forged brass tail nut, helps to make Commonwealth-Lavigne Radiator Valves one of the greatest values on the market.

Your Jobber Can Supply You

COMMONWEALTH BRASS CORPORATION
DETROIT, MICHIGAN

LAVIGNE COMMONWEALTH
RADIATOR VALUE



Jenarco Sheet Packing

Nobody likes leaks

—and it pays the plumbing contractor to be sure of the packing he uses. Ask yourself these questions when you pack a joint.

"Will this packing last?"

"Is it tough?"

"Am I sure it will not crack, crumble, nor squeeze out at the joint?" You can place full confidence that the answers will be "Yes" if it's a Jenkins Packing — made to the same high standards as a Jenkins Valve.

Jenkins '96 Sheet Packing

Jenkins '96 Sheet Packing

Jenkins Packings are obtainable in sheets or ready-cut gaskets and include JENARCO, a red vulcanized packing for hot and cold water and saturated steam; JENKINS '96, a black unvulcanized packing for hot and cold water and saturated steam, AT ALL pressures; COMPRESSED ASBESTOS JOINTING for high pressure superheated steam; and OIL-TITE, as its name implies for oil service.

JENKINS BROS.

80 White St.....New York, N. Y.
524 Atlantic Ave.....Boston, Mass.
133 No. Seventh St., Philadelphia, Pa.
646 Washington Blvd...Chicago, Ill.

JENKINS BROS., LIMITED
Montreal, Canada London, England

Send for this folder Describing Jenkins Sheet Packing and Gaskets.

JENARCO **Jenkins Packing**
96 96 96 96 96 96

One-Piece Multiflex Bellows are manufactured in all sizes for our own products. Manufacturers using or contemplating the use of bellows will find a reliable source for their requirements at our factories. Full information upon request.

Dependable Equipment

IN the manufacture of thermostatic traps or heating specialties, pneumatic valves or temperature control equipment, or other fields in which The Bishop & Babcock Mfg. Co. is engaged, the engineering and manufacturing facilities of the Company have always been adequately provided to insure a product of highest quality without dependence on outside sources for any part of the finished product.

This is strikingly true in the instance of products containing Multiflex Seamless Metal Bellows, which are used in the most advanced types of appliances in the heating specialty and temperature control fields. The Bishop & Babcock Mfg. Co. has always manufactured its own Seamless Multiflex Bellows, and through progressive improvement in manufacturing processes under their own direction are making a paramount product of its kind.

When you see the trade name MULTIFLEX on a product, it reflects a unification of interest with a single aim of progressive development and highest quality in its manufacture.

THE BISHOP & BABCOCK MFG. CO.
General Offices and Factories Cleveland, Ohio
Offices in Principal Cities

BISHOP & BABCOCK
HEATING SPECIALTIES

Bold Stroke Abandoning Co

Widely Endorsed

Thousands of letters endorsing the new Novelty Boiler Selection Plan have been received by the Abram Cox Stove Company, originators of the plan, and each day's mail brings more.

The Novelty Boiler Selection Plan does away with confusing boiler ratings entirely and shows how the exact size boiler for a given job can be easily and quickly determined by chimney flue conditions. It is a system as accurate as it is revolutionary, and it is set forth clearly and concisely in the 1925 Novelty Handbook, which is free on request.

NOVELTY BOILERS

Here are a few extracts from letters which show the approval of Heating Contractors and Engineers

"The Abram Cox Stove Company are to be highly commended for their initial step in establishing their new system of boiler selection. Different manufacturers have highly inflated their ratings in order to receive a paltry few more dollars, instead of trying to render the public a trifle more in satisfaction."

* * *

"This book is just what steamfitters want when selecting the proper size boiler."

* * *

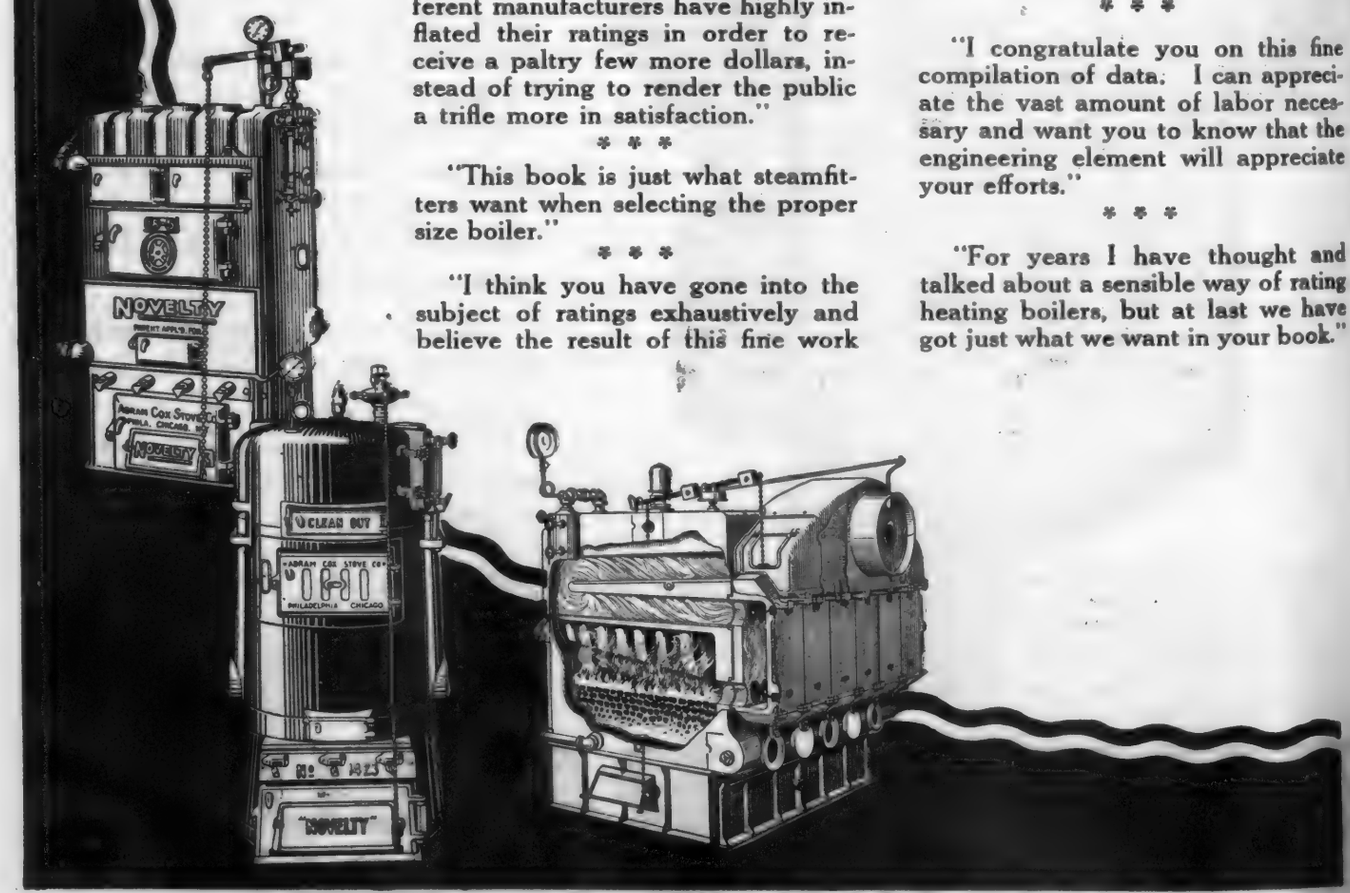
"I think you have gone into the subject of ratings exhaustively and believe the result of this fine work will be to eliminate the general confusion which has existed lately in regard to the ratings of heating boilers."

* * *

"I congratulate you on this fine compilation of data. I can appreciate the vast amount of labor necessary and want you to know that the engineering element will appreciate your efforts."

* * *

"For years I have thought and talked about a sensible way of rating heating boilers, but at last we have got just what we want in your book."



Catalogue Boiler Ratings

y Heating Trade

From the engineer of mechanical construction of a big public service corporation:

"The information given in this new catalog on your Novelty Boilers is just the kind of information that any heating engineer needs. We feel that it would be much better for all manufacturers to get their boilers down to this method of rating. We think you have made a wonderful step toward something that will be appreciated more and more by the man whose business it is to select the proper size boiler and chimney for the job."

* * *

From the Professor of Heating and Ventilation and Head of Department of Mechanical Engineering of a large university:

"I have looked over this catalog with a great deal of interest and congratulate your company upon having taken such an advanced step in presenting definite engineering data relative to the basis on which your boiler capacities are determined."

* * *

"I believe it is the best pamphlet that has ever been brought to my attention."

* * *

"I want to congratulate you on the very clear, concise and comprehensive way in which you have explained the capacities of the various sizes of your boilers. This information will appeal to every practical heating man using boilers, and especially to those who are not quite conversant with the steam and hot water heating practice. **You have blazed a trail for many to follow.**"

* * *

"I have no hesitancy in saying your method of rating is a correct way of obtaining, quickly and with very little trouble, the practical rating of your boilers. You have made a distinct advance which will benefit the entire trade. The present method of rating is an abomination and is a puzzle and delusion to the trade."

* * *

"Boiler lists of capacities and prices gotten up in this way is what the trade has wanted for many years and we commend your energy in being the first of the large companies to take this stand relative to boiler ratings, etc."

ABRAM COX STOVE CO.
American and Dauphin Sts.
Philadelphia, Pa.

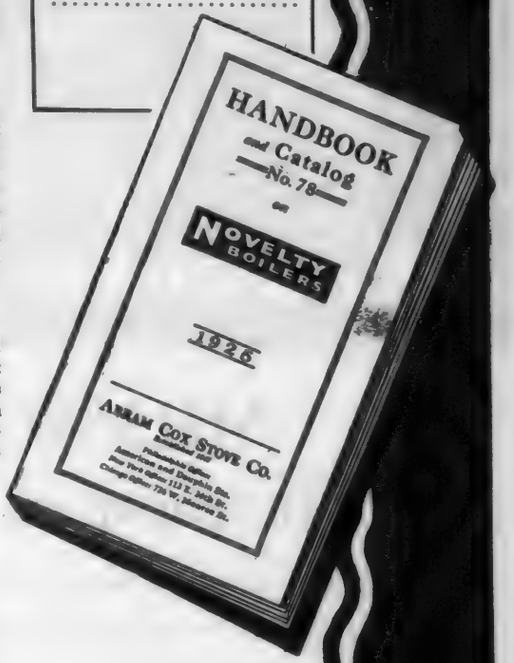
Gentlemen:

Please send me a copy of the 1925 Novelty Handbook which tells the actual amount of radiation which can be installed with each boiler.

Name.....

Address.....

.....



Your copy of the 1925 Novelty Handbook is waiting for you. Write for it now. Address Dept. H-7 at the nearest office.

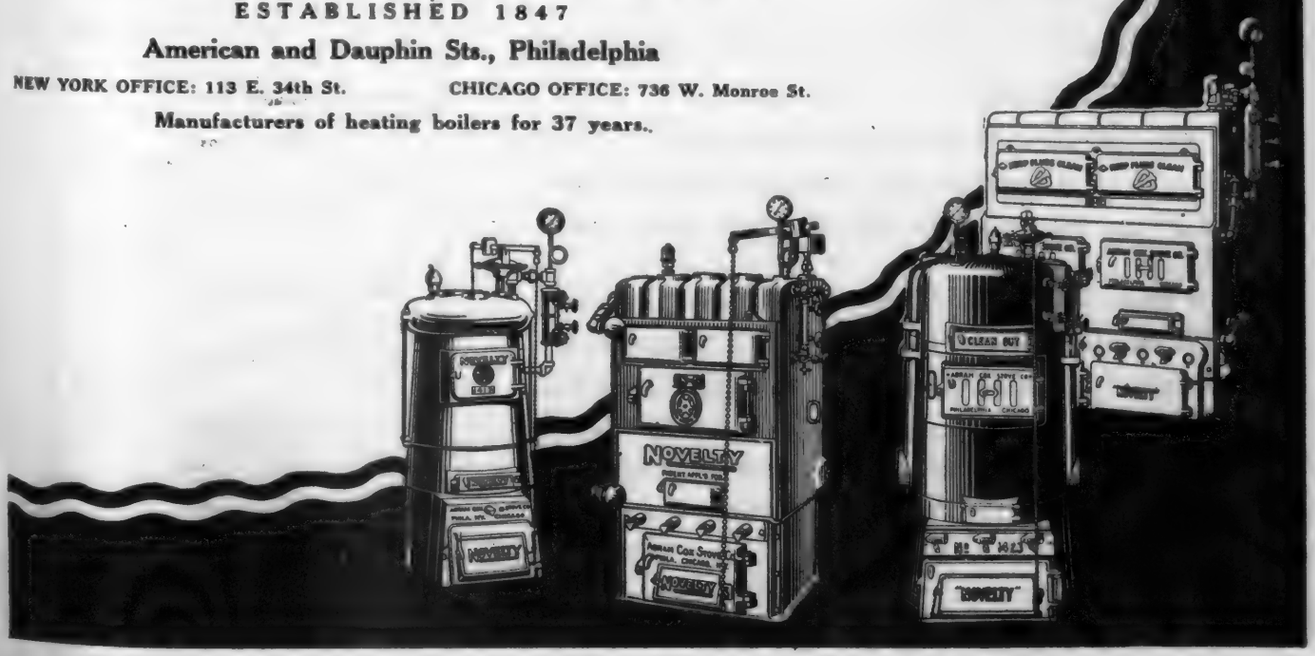
ABRAM COX STOVE COMPANY

ESTABLISHED 1847

American and Dauphin Sts., Philadelphia

NEW YORK OFFICE: 113 E. 34th St. **CHICAGO OFFICE: 736 W. Monroe St.**

Manufacturers of heating boilers for 37 years.



"MILVACO" Thermostatic Trap

Thousands of successful installations throughout the United States testify to the adaptability and efficiency of this high grade product.

"Milvaco" Thermostatic Traps are constructed of the highest grade materials.

They will pass all water of condensation and air from a vacuum or vapor system, will positively prevent passage of steam, are noiseless, self-cleaning and durable.

It is our pleasure to announce at this time to the trade the addition of the Dole "Milvaco" Packless Ball Bearing Radiator Valve, formerly sold through The Dole Valve Company of Chicago. This efficient heating specialty will henceforth be marketed through the sales organization of the Milwaukee Valve Company, Milwaukee, Wis.

The "Milvaco" Line

Standard Valves

Radiator Valves—All Types
Union Elbows Gate Valves
Globe Valves Angle Valves
Compression Stops and Wastes
Compression Stops
Brass Unions Needle Valves
Throttle Valves Cross Valves
Key Air Valves
Expansion Tank Gauges

Heating Specialties

Packless Radiator Valves—
All Types
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Direct Return Traps
Air Line Valves
Thermostatic Traps
Air Eliminators
Quick Vents

Underwriters Approved Valves

Gate Valves
Angle Valves
Globe Valves
Throttle Valves

MILVACO
MILWAUKEE VALVE CO

MILWAUKEE VALVE CO. MILWAUKEE, WISCONSIN

Typical Elevation of a Webster Type "R" Modulation System of Steam Heating

—the time to decide

GIVE early consideration to selection of the heating system for each building . . . the time to decide on the type of system is *before* the architectural plans are completed.

Webster Service—called in during the preliminary planning—will help to determine location, size and depth of boiler room and size of flue, to make adequate provision for concealing piping and often, by suggesting slight changes in door or window location, point out a saving in piping and betterment in arrangement of radiators. Webster Service works with architects, engineers and contractors to one end—the satisfaction of their clients.

Webster Service is an integral part of every Webster Vacuum and Modulation System of Steam Heating. Let the nearest Webster branch manager outline our method of helping you.

The Webster Type "R" System

Buildings of almost every type are being heated by Type "R" Webster Systems of Steam Heating (shown above). Architects and owners are enthusiastic about its *fuel economy—ease of operation* and *high overload capacity*. Write for Bulletin 716 describing this system before deciding on your next installation.

Warren Webster & Company

Pioneers of the Vacuum System of Steam Heating

Camden, N. J. **50 Branch Offices**

In Canada, Darling Bros., Ltd., Montreal

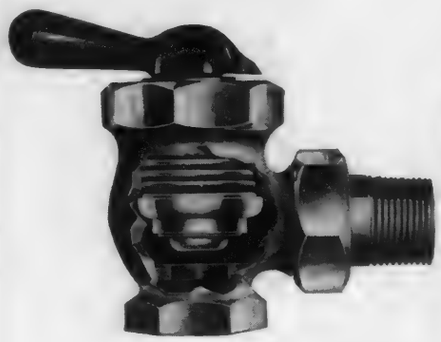
- since 1888

Webster Systems of Steam Heating

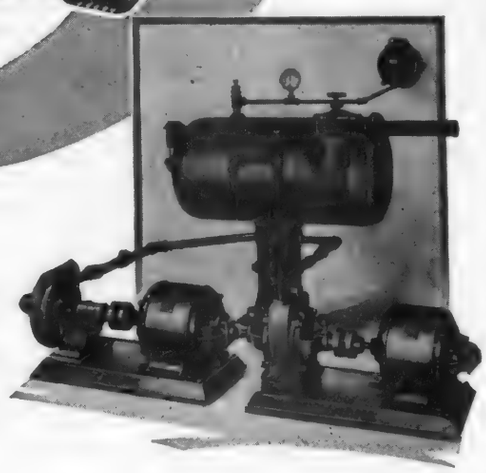
More than 34,000 installations in America's finer buildings

TRANE'S BIG THREE

BELLOWS PACKLESS VALVE+BELLOWS TRAP+VACUUM PUMP



USE THEM TOGETHER



UNDIVIDED RESPONSIBILITY

Trane Bellows Trap 14 corrugations. Bellows 1¾ inch in diameter. Brass body. Normal range 15-inch vacuum to 25 pounds pressure. Guaranteed 5 years. Described in Bulletin 14.

Trane Bellows Packless Valve Absolutely packless in every respect. Contains genuine Trane Bellows. Brass body. Indestructible handle. Described in Bulletin 14.

Trane Vacuum Pump Separate Case Construction. Single or two-motor drive. 350 combinations. Pedestal type tank with built-in strainer. Less motor horsepower for a guaranteed capacity than any other vacuum pump ever designed. Described in Bulletin 20.

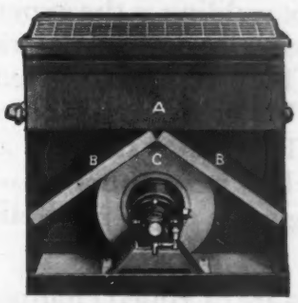
Write for the Trane Bulletin Binder, describing the entire line of Trane Heating Specialties and Trane Pumping Equipment.

HEATING TRANE PRODUCTS PUMPING

THE TRANE COMPANY, 206 Cameron Ave., La Crosse, Wis. Manufacturers of vapor and vacuum heating specialties and pumps. Branches and sales connections at New York, Chicago, Boston, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany, Minneapolis, Salt Lake City, Ft. Wayne, Portland, Ore., Greensboro, N. C., Zanesville, Ohio, Atlanta, Ga., Des Moines, Ia. In England: 22:23 Clerkenwell Close, London, E. C. 1. In Canada: The Trane Co., 28 River St., Toronto; Thomas Robertson & Co., 184 Craig St., West, Montreal; F. S. Murdoch, 310 Breadalbane, Winnipeg. In Japan: The Uchida Trading Co., Ltd., Tokio—Osaka—Kobe. In China: C. J. Doughty & Co., 7 Jinkee Road, Shanghai.

MARSHALL SCHOOL, JOLIET, ILLINOIS, UNIVENT EQUIPPED. LEO J. WILHELMI, JOLIET, ILLINOIS, *Contractor*

King Canute and the Heating and Ventilating Business



Open view of* UNIVENT *illustrating

A.—Copper radiator without a single joint, absolutely leak-proof.

B.—Air filter easily removable for cleaning.

C.—Cone type fan specially insulated for quiet operation.

UNIVENT
(TRADE MARK)
Ventilation

King Canute was an ancient king so powerful that he thought he could do anything. To prove it he went down to the ocean edge and commanded the tide to stop.

Needless to say he got his feet wet, and would have had a good ducking had he not given way to the tide.

In every business there are King Canutes who try to stem the tide. They change front or lose out.

Progress now demands that modern school buildings have Univent Ventilation and heating. The progressive engineer realizes this to his greater profit. He also realizes that Univent heating and ventilating is the coming system in the modern office building.

Write for Architect and Engineer's Edition of Univent Ventilation. You will approve of its mechanical simplicity, its adaptability and flexibility.

Easy to install in new or old building.

THE HERMAN NELSON CORPORATION *Moline, Ill.*

1944 Third Avenue

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How Quality is Built Into

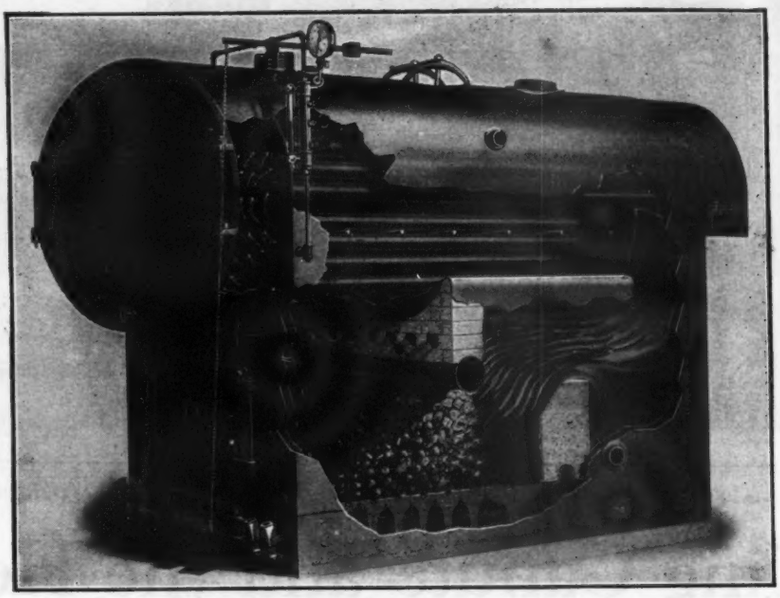
HEGGIE-SIMPLEX

[FORMERLY SIMPLEX]

ELECTRIC-WELDED STEEL BOILERS

Correct heating principles find their most perfect expression in this boiler *design*. The Heggie-Simplex is a combination firebox and double-pass tubular boiler, with six distinctive features of basic importance:

1. Extra large firebox and *direct* heating surface.
2. Secondary combustion chamber to provide ample room for complete combustion before entering flues.
3. "Rear-front-rear" flue passage for the gases.
4. A single, unimpeded, freely circulating body of water.
5. Doors for cleaning flues in the front.
6. Smoke outlet in the rear.



IN *Quality* of material and workmanship as well as in *Design*, Heggie-Simplex Boilers express that superiority which is usually found in the products specified by the discriminating.

All plates are of firebox steel of guaranteed tenacity and low carbon content—because such steel welds better, fuses better and affords greater strength than ordinary flange steel.

Thicker plates are found in no other boiler—but Heggie-Simplex Boilers employ thicker plates than are ordinarily used in most others.

Heggie-Simplex welding is the expert workmanship of pioneers in electric arc welding. The plates are beveled, then abutted. This assures fusion of a solid joint. The plates become as one. The work is never hurried — Heggie welding costs more per hour and per foot.

All boiler bases are of rolled channel iron. Grates are of the best gray iron castings—of the heavy, durable rocking type. Individual grate brackets permit better adjustment for contraction and expansion, smoother grate action and simpler replacement.

To all interested in that union of Quality and Correct Design which affords the most reassuring investment in boiler equipment, we will gladly send more detailed information, with list of typical installations.

HEGGIE-SIMPLEX BOILER COMPANY, Joliet, Illinois

Representatives in

Akron, Albuquerque, Amarillo, Atlanta, Baltimore, Birmingham, Buffalo, Casper, Charlotte, Chattanooga, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Elmira, El Paso, Harrisburg

ELECTRIC-WELDED HEGGIE-SIMPLEX STEEL BOILERS

Representatives in

Houston, Joliet, Kan. City, Mo., Little Rock, Lubbock, Memphis, Minneapolis, Nashville, New Orleans, New York, Okla. City, Omaha, Philadelphia, Pittsburgh, Raltigh, Rochester, San Antonio, Schenectady, Shreveport, Spartanburg, St. Louis, Tampa: Toledo

Just look up "Heggie-Simplex Boiler Co." in the phone book in any of the above cities for representative's number and address

The Heating and Ventilating Magazine

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Why Is It?

That a man will build a home, put in it a modest heating plant, and buy a Ford? A couple of years later he buys a Dodge. In two more years he has graduated to some six-cylinder car, because of a desire to be up-to-date. Before long he is stepping on the gas in a twin-six or a picket-fence eight. This bi-annual change is due, undoubtedly, to high-pressure advertising. It has been convincing advertising. Results prove the effectiveness of the appeal. Ten, twelve or more years have elapsed since the acquirement of the Faithful Lizzie and the cheap heating system. Ten to one the old heater is still doing business. Door frames and damper frames are loose and leaky, the heater is inadequate and the coal bills are increasing. Yet, the old heater stays and imperfectly warms the home and the man drives down the street in his new and shiny car. Isn't this a common occurrence, and isn't there an object lesson in this story?

YEARLY SUBSCRIPTION $2.00 **SINGLE COPIES, 20 CENTS**

Published monthly at 1123 Broadway, New York, by the Heating and Ventilating Magazine Co.

Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

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Day and Night Fuel Economy Push Button Control of Temperature

Since 1885 this company has been equipping all classes of buildings with fuel saving automatic temperature regulation. Practically every worthwhile improvement in automatic temperature regulation has been this company's invention and development. The Johnson System of Temperature and Humidity Control has long been regarded as the utmost in possible perfection, and thoroughly efficient. Now The Johnson System has been brought to the very final step of complete temperature regulation: the addition of the DUAL THERMOSTAT; day and night temperature adjustment by a single push button control.

The DUAL THERMOSTAT

In the Johnson System of Temperature and Humidity Control—

At the end of day, the building manager presses a push button on the wall of his office. The heat in all of the rooms vacated for the night is shut off, or lowered to the very minimum; and the heat only for those rooms to be used at night is left on. Next morning, pressing the same push button restores ALL of the rooms in the building to normal heat for the day. The great night time fuel saving possibilities, the certainty and valuable convenience furnished, are readily appreciated.

The fact that this company recommends the DUAL THERMOSTAT is sufficient assurance that it is totally practical and reliable. However, it is having ample success in the many installations already made to furnish further endorsement of its value. A Johnson Service Company engineer will gladly call with details; as applied to your particular type of building; and with a working model to demonstrate:

JOHNSON SERVICE COMPANY

Main Office and Factory: MILWAUKEE, WISCONSIN

AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL SINCE 1885

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